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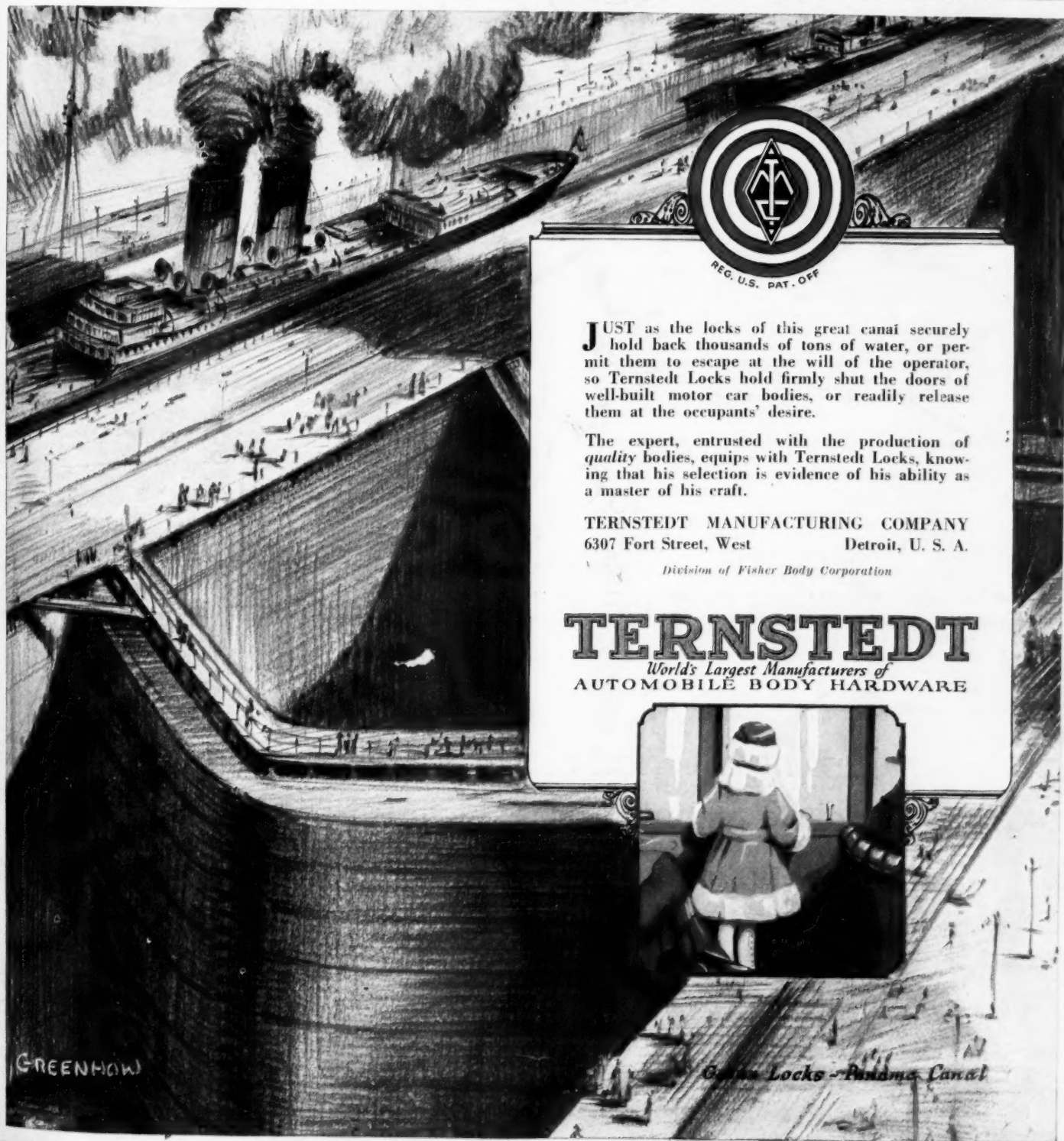
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol 50
Number 7

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, FEBRUARY 14, 1924

Thirty-five cents a copy
Three dollars a year



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AUTOMOTIVE INDUSTRIES

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VOL. L

NEW YORK—THURSDAY, FEBRUARY 14, 1924

No. 7

Sales in 1924 Not Likely to Equal Productive Capacity

Tentative schedules call for output of 5,500,000, which would be 50 per cent increase over 1923. This would force dealers to handle more than 9,000,000 cars.

By James Dalton

TOTAL productive capacity of the passenger car plants of the country is something like 5,500,000, and practically all makers profess to believe they can sell all the cars they can make this year. This would mean more than twice as many as were turned out in 1922 and half again as many as the record established in 1923. If the entire industry operates on a capacity basis, the output for the three years will have been approximately 11,750,000.

Serious thinkers both within and without the industry do not believe that car sales will exceed the 3,625,000 mark set last year, notwithstanding the fact that the tentative production schedules fixed by Ford and Chevrolet alone would exceed this figure by 175,000. The schedules fixed by Willys-Overland, Buick, Studebaker, Dodge, Essex, Olds and Hupp alone would add another 1,000,000. The totals for these nine companies, therefore, would be 4,800,000, with Ford alone making 3,000,000, although his truck production would have to be deducted. The only ones in this group which are not planning a substantial increase are Dodge and Studebaker.

The first ten companies last year made about 85 per cent of the total, and if the same percentage held good next year on the basis of the production schedules outlined, the remainder of the industry would turn out around 700,000, which would give a 5,500,000 total.

WE doubt, as do others who have studied the situation, that it will be possible to sell any more cars in 1924 than in 1923, if as many. If this belief proves correct, tentative production schedules will have to

be shrunk by something like 1,900,000. The saving grace of the situation is that most companies are making commitments cautiously and they should be able to curtail output without difficulty. Present prices, however, are based on capacity production, and any reduction in output will automatically force increases unless profits are to be sacrificed. Price increases will set up sales resistance, temporarily, at least.

BUSINESS will be good in 1924. There can be no argument about that. A production of about 341,000 in January proves that it is better than ever before at this time of year. The present record of freight car loadings shows the same is true of trade and industry in general. When there has been no inflation there can be no deflation, and the country now is operating on a strict business basis. No industrial relapse is in sight for the first half year, and the only dark cloud in sight is the possible effect of a Presidential campaign. Even that probably is exaggerated. So far as Congress is concerned, party government is non-existent today, and no conditions conceivable at present could make conditions any worse than they are. Recent history has proven that Congress, after all, is the real arbiter of our destinies.

It is perfectly safe, therefore, to base plans for the coming year on the expectation that business for the year as a whole will be exceedingly good. With the export market for surplus farm products no stronger than at present, however, it seems folly to expect that the volume of trade, even in individual

Analysis of 1923 production figures shows that the ten largest makers in point of units made 3,193,000, or 87 per cent of the total. This compares with 85.7 per cent for the ten leaders in 1922 and is the largest in the history of the industry except 1915, when it was 93.4. The nearest approach to it in any other year was 86.3 per cent in 1921.

Five of the ten leaders, in the \$500 or under class, made 2,542,000, or 70 per cent of the total.

There were 14 companies with a production in excess of 40,000, and they made 3,371,000, or 92 per cent of the total.

There were 18 companies with a production in excess of 20,000, and they made 3,469,000, or 95 per cent of the total.

The production of the ten leaders, in order, was: 1,750,000, 433,000, 200,000, 200,000, 160,000, 142,000, 139,000, 60,000, 59,000 and 50,000. The next two in line made 48,000 each and the next two 41,000 each.

transportation, will show as great a gain over 1923 as last year did over the preceding year. Nevertheless, that seems to be exactly the theory on which individual automobile manufacturers are basing their plans.

No one up to this time has been able to plumb the depths of the motor car market. A year ago a forecast of a production of 3,625,000 passenger cars in twelve months would have been laughed to scorn. For that reason a somewhat similar reception may be given the contention that 1924 output will not mark another 50 per cent increase in automobile sales.

Ford Has Ambitious Program

It can be asserted with entire truth that Henry Ford seldom makes mistakes. He has set a goal of 3,000,000 for his organization for this year and it may be asserted that he knows pretty definitely what he is doing. We are not prepared to say he doesn't, but we don't believe that many Ford cars, trucks and tractors can be sold this year. His passenger car output in 1922 was about 1,100,000, and in 1923 it was about 1,750,000. On the same percentage basis it would be about 2,625,000 this year. This would be an increase of nearly 140 per cent over two years ago and of 50 per cent over a year ago. Not all these cars would be sold in the United States, of course, for he disposed of approximately 175,000 in foreign markets last year and he believes 1924 will show a big increase in this field.

Lumping the tentative passenger car production schedules of the three leading producers in the "\$500 class"—Ford, Chevrolet and Willys-Overland—we get a total in excess of 4,000,000. We would have nearly that many, eliminating the Willys-Knight, which is in a higher price class. This would be 33 per cent of all the passenger cars registered in the United States on Jan. 1. There are not more than 10,000,000 Americans with incomes in excess of \$1,500 a year, and with sales at such a rate there would be more than one car for each of them by the end of 1924, including the Fords alone already in use.

Millions Cannot Afford Maintenance

Little reliance can be placed on income tax returns as a basis for computing the number of potential motor car buyers, but there are not many more than 25,000,000 families in the country, and more than half of them already are supplied with cars. It has been asserted that the "saturation point" will not be reached until every family has a car, but that is not strictly true. It may apply in rural, but not in urban, communities. So long as anything like present living conditions prevails in large cities there always will be several million families who cannot afford to own cars because of high garage

charges. Most of them would be able to buy one, but they couldn't keep it, with house rents at the prevailing high level.

Buying some kind of a motor vehicle which will run is about the easiest thing in America today. They can be had at any price from \$25 up, and they can be paid for on any terms from "a dollar down and a dollar a week" up. Keeping the breath of life in their insides and a roof over them is much more difficult, and that's why so many families can't become motorists until their economic position is improved.

But even if the American people could absorb 5,000,000 or 5,500,000 automobiles this year, could the dealers of the country sell them. As the business stands today, it is almost literally true that the more new cars they sell the less money they make. They performed last year the Herculean task of handling 6,725,000 automobiles, of which nearly 3,100,000 were used cars. Three out of four of the new cars sold involved buying a piece of second hand merchandise, and only a small percentage of the dealers made money.

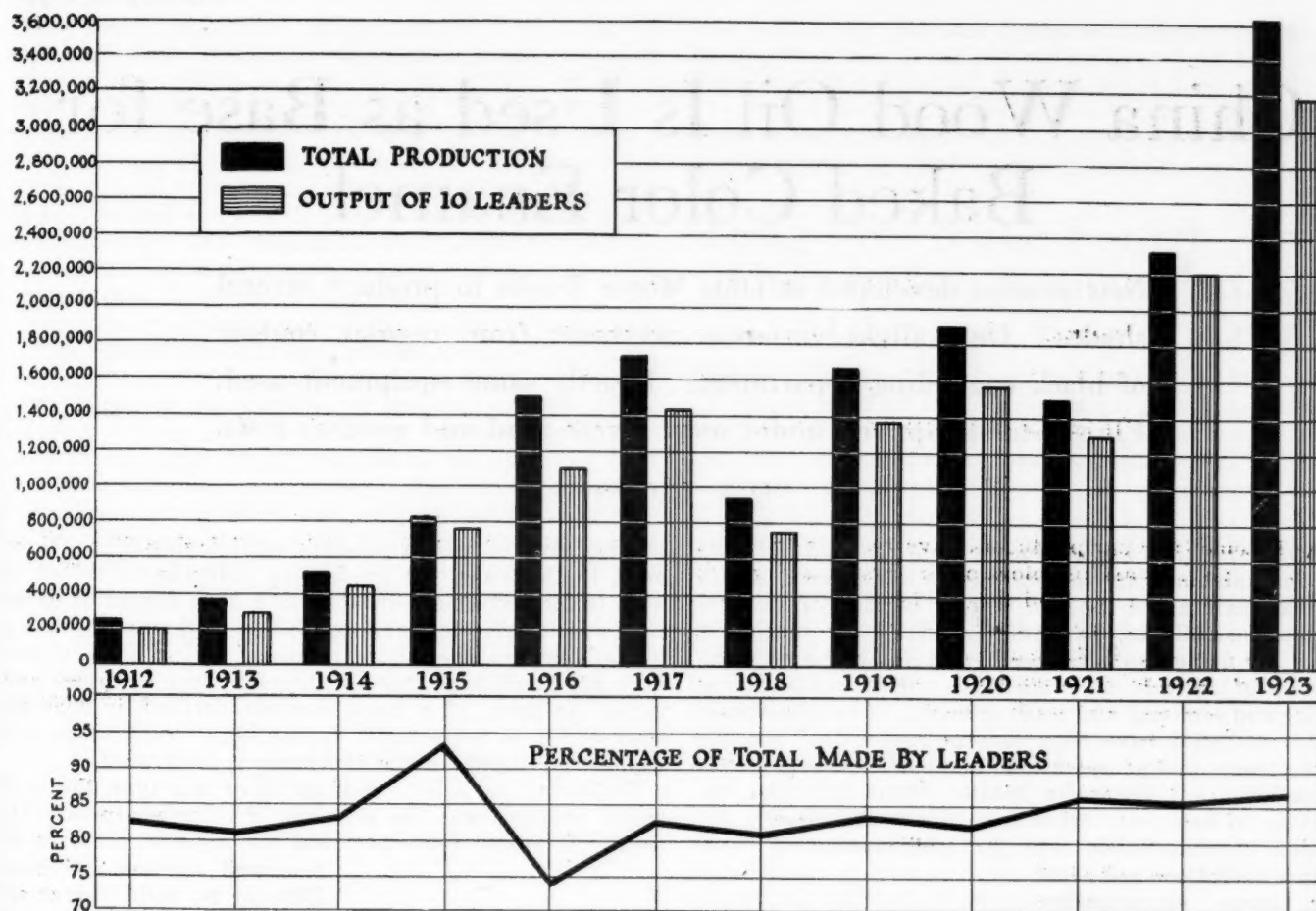
Four Sales Out of Five Mean Trades

The percentage of transactions which will involve a used car will increase this year to at least 80, so that it will be possible to get rid of only one car out of every five without a trading allowance.

This means that if the dealer organizations succeed in selling 5,000,000 new cars they will have to dispose of 4,000,000 which have been used, making a total of 9,000,000. They will tell you themselves it can't be done. That is one for practically every income over \$1,500 and at least one for every three families.

Naturally, as the number of cars in use grows larger, the replacement market expands, but we never have found anyone who has the most remote idea what it is. Deducting the number of trades from the number of cars sold last year, we find that there were only a little more than 900,000 first buyers. Even with 5,000,000 new car sales this year, there would be only about 1,000,000 who would be owning automobiles for the first time. It might be said, therefore, that the replacement market would run from 3,000,000 to 4,000,000 a year, but it would be just about as accurate as guessing the number of flies around a sugar barrel.

When the term "replacement market" was originated, it was based on the theory that a certain number of cars are junked each year. That undoubtedly is true, but who knows how many? Then statisticians began trying to figure out the average life of a car. They estimated that it was between six and seven years. Using this theory, all the cars made either six years ago or seven years ago ought to go to the junk pile this year.



The "average length of life" method of determining replacements is just about as satisfactory as the same system would be for the shoe market. The length of life of a pair of shoes depends entirely upon the quality, how hard the owner wears them, and how long he is content to go around wearing a pair which is more or less shabby. The average pair of theoretically worn-out shoes would keep the feet of a person who wasn't fussy off the ground for a considerable period. In lean years, like 1921, shoes are worn a good deal longer than they are in flush years, like 1923. It's exactly the same with motor vehicles.

Used Cars and Replacements

If the replacement market refers to the number of present owners who buy new cars, no one knows what it is. In good times the best gage is the ability of dealers to sell used cars and their willingness to make liberal trading allowances. In less prosperous periods it depends upon the condition of the car and the economic status of the owner. The average owner today probably doesn't keep a car more than three years if he can find the means to get a better one.

Literally, the replacement market includes only automobiles purchased to supplant those which have become extinct.

Passenger car registrations increased 2,668,000 from Jan. 1, 1923, to Jan. 1, 1924. This was about 950,000 less than the number produced last year. It has been estimated that something like 500,000 cars were in the hands of dealers at the end of the year, from which it may be assumed that about 450,000 went out of use in 1923.

Dealers have lost in the past a great deal more money than they are going to lose in future in handling used cars. Under the constant driving of their factories they have made too liberal allowances, chiefly to stimulate new

car sales. Factories have been striving for volume, and dealers have been doing yeoman work to give it to them.

Until recently, most manufacturers have taken the position that the used car was exclusively a dealer problem. Those who haven't discovered that it isn't will find to their sorrow, sooner or later, that it has an important bearing on their own business. When a dealer's capital is tied up in second hand merchandise he can't buy new goods, and he isn't likely to work his head off taking up bills of lading unless he can make a reasonable profit out of the goods covered. The average used car allowance will get smaller and smaller each year, with the natural result that owners will run the ones they have longer and longer.

Just as long as times are good, however, there will be an insistent demand for used cars. The longer a period of depression is delayed, the fewer families there will be which do not own an automobile. When such a time comes, all theories about the replacement market will be shot to pieces. Demand will evaporate like dew under a summer sun, just as it did in the fall of 1920, except that the evaporation process will be much more rapid and more complete. This country is pretty thoroughly motorized already, and it could get along for quite a while with a lot fewer new automobiles than were made in 1923 or are likely to be made in 1924.

Two Biggest Factory Problems

For every manufacturer there are two major problems:

1. The desire of the public to buy his products.
2. The ability of his dealers to sell them at a profit.

Those who are wise will be in a position to shorten sail on short notice if it becomes necessary. The sad part is that while executive after executive will tell you privately he doesn't believe demand will keep ex-

(Continued on page 341)

China Wood Oil Is Used as Base for Baked Color Enamel

New process developed at Olds Motor Works to produce several shades. Only slight variation necessary from regular routine of black enameling department. Exactly same equipment used. Finish stands up well under most severe road and weather tests.

By W. L. Carver

FOR some time car producers have realized the need for finishing cars in colors other than black, which has maintained its hold largely because of its production possibilities, particularly where the output is large. By using asphaltic base enamels, the happy combination of durable, lustrous finish with manufacturing facility and economy was made possible. The advantages of this material have been largely responsible for the developments in line operations and conveyor-type ovens which are used generally today. Until recently, the selection of any color other than black immediately demanded varnish finish, with its complication of slow, delicate operations and great floor space requirements.

A recent development in color finishing on a production basis is noteworthy, as the desirable sales aspects of brighter colors are combined with the manufacturing advantages of the asphaltic enameling process. The Olds Motor Works is finishing its sport touring model in a weathered-bronze green by a baked enamel process. The process is more noteworthy as but little variation has been made from the routine of the black enameling department and the same equipment is used. With the exception of one slight variation, the same steps are followed in a common department. Development of material rather than equipment has made the process commercially possible.

In this development work the biggest problem was that of getting away from the older established lines of thought. The enamel makers attempted to build from the existing asphaltic enameling processes while the paint and varnish suppliers tried out materials based on the usual linseed oil and gums. Until these ideas were discarded, experimental coatings were unsatisfactory and showed the brown, smoky appearance which characterizes these materials under the influence of enameling heats. The problem was finally approached from an entirely different angle, which may be likened to the development of the color characteristics of a permanent or indelible ink, and success was achieved.

In the new material, the base is China wood, or Tung oil, which comes from the seeds of a tree common to China and known as the varnish tree. This tree is of the same natural order as the castor bean, candle nut, and

others, most of which produce semi-drying oils. However, in this case, the product is a drying oil which is high in lac, extremely durable, of a high degree of penetration and adhesion, and capable of withstanding much higher temperatures than the usual drying oils. Under ordinary conditions this oil absorbs oxygen rapidly and takes the form of a hard, flexible surface or coating. This action is accelerated by the high temperature and copious air supply of the ventilated type of oven.

Following the selection of an oil of this type, the next major problem was the pigment or color-producing element. It finally developed that the pigment must be in thorough solution and have little or no solid characteristics. Following this line, the pigment is triple ground and baked and then put into solution with a carrier and clarified. The solution is then allowed to settle and only that portion which remains in solution is mixed with the oil. The solid portion which settles out is reprocessed. In addition to the weathered-bronze green which is already in production, shades of red, blue and green have been developed.

Great credit for this de-

velopment is given to the firm of Ault & Wiborg by the Olds organization.

In production, bodies leave the end of the line in the body building department, which is adjacent to the enameling line. At this point they are placed on individual carriages and thoroughly cleaned with gasoline and sandpaper. No commercial cleaning compound is used here, as the bodies are built entirely under one roof, the stamping department, body building line and enameling department being in close proximity. As all of the metal parts, as well as the assembled bodies, are processed rapidly through the various lines, little opportunity for rusting or corrosion is offered.

Each body on its carriage is then run into a drain deck, where the priming coat is flow-coated on in the usual way. This coat is very high in oil, the percentage being 87, and fairly low in pigment. As the oil is highly viscous, additional draining time must be allowed before the body enters the oven. Therefore, the body remains on the draining deck for a period of 12 min. and then is placed on the conveyor line, where a further period of 20 min. intervenes before entrance is made into the oven.

SUBSTANTIAL progress has been made in the past year in the development of improved finishing materials for automobile bodies. Hitherto the need for speed in production has made black the standard color, although many purchasers prefer other tints. This article describes a noteworthy new development in color finishing on a production basis which combines the sales advantages of brighter tints with the manufacturing advantages of the old process.

The 12-min. stationary drying period is required, as these bodies are handled on the regular black enameling conveyor line, which is timed for the 20-min. draining period. A maximum temperature of 360 deg. Fahr. is maintained, and 100 min. are required for the body's travel through the length of the oven. The ovens are of the tunnel type, being arranged in parallel banks, and both heated and ventilated in sections. The furnaces are oil-fired and the circulating air is passed through an air washer. The temperature at each section of the oven is maintained by electrical equipment.

Upon emerging from the oven the body is given a light sanding operation and is spot-puttied to correct all slight irregularities. This operation requires about 3 min. and is performed on an extension of the oven conveyor line. The flow-coating operation is then repeated, being followed by the same drying periods on the deck and line, 12 min. and 20 min. respectively. This coat contains a reduced percentage of oil, but an increased pigment content, forming the undercoat. Following the routine of the first baking the body again passes through a 100-min. period in the oven at 360 deg. Fahr.

Copal Gum Added to Last Coat

After this baking the body is rubbed with wet or dry sandpaper and water and then is sponged and cleaned off with chamois skin preparatory to the final coat. The body is then returned to the draining deck for the final flow coat, which is followed by the former draining conditions and time periods. In order to improve the luster the pigment content of this coat is greatly reduced and is augmented by the addition of copal gum, a colorless resinous product which provides a bright, highly durable finish. The body then remains in the oven for 130 min. at a maximum temperature of 250 deg. Fahr., after which it is striped and delivered directly to the trimming line.

In tabulated form the routine from delivery to the enameling department to delivery to the trimming line is as follows:

1. Clean with sandpaper and gasoline.
2. Flow on priming coat.
3. Drain, 12 min. on deck and 20 min. on line.
4. Bake at 360 deg. Fahr. for 100 min.
5. Sand and spot putty.
6. Flow on undercoat.
7. Drain, 12 min. on deck and 20 min. on line.
8. Bake at 360 deg. Fahr. for 100 min.
9. Sand, using wet or dry sandpaper and water, sponge and wipe off with chamois skin.
10. Flow on finish coat.
11. Drain, 12 min. on deck and 20 min. on line.
12. Bake at 250 deg. Fahr. for 130 min.
13. Varnish stripe.

This routine is no more complicated than that of black enameling of equivalent depth and quality and the total production time is well within 9 hr.

Handling in Shop Not Complicated

From the handling angle, both in the shop and in service, this finish has been put through the most severe tests and has been required to fulfill all of the demands which are met by the asphaltic black enamel. Cars finished by this process were put in continuous operation on the road under all conditions. The finish was deliberately neglected and then cleaned in the crudest way. Bodies were placed on the roof of the plant to undergo the full effect of varying weather conditions.

The pliable characteristics of the finish were tested by denting the body and bumping out the depressions. In all of these tests the finish has demonstrated its gen-

eral quality in a marked degree and apparently has the permanency and durability which have long been associated with black enamel. Colors which have practically the same luster as a varnish finish retain this quality indefinitely, and any minor scratches acquired in service can be effaced by rubbing and polishing.

Tung Tree Nuts, Found Only in Inaccessible Parts of China, Is Base of Enamel

THE following statement in reference to the use of China wood oil in the preparation of baking enamels, together with some little known facts about the oil itself, has been written for AUTOMOTIVE INDUSTRIES by M. C. Longenecker, manager of the varnish works of the Ault & Wiborg Co., of Cincinnati:

That baking enamels could be applied to bodies and other metal parts of an automobile has, in the writer's mind, always been a possibility, and the development to this end has been demonstrated by the results obtained at the Olds Motor Works. For a number of years protective and decorative coatings have been applied to many forms of metal construction, namely metal doors, cabinet work, metal desks, filing cabinets, motors and bicycles, beds, cash registers, typewriters, and in fact all metal construction. The method followed for this work is different in application and the manner in which the work is done, but the result attained in the many different finishes upon metal justified the opinion that the same finish could be worked out for all parts of an automobile.

Automobile bodies have for a number of years been coated with black enamel. The character of the black enamel, however, in composition is an entirely different product from enamels carrying color. In black enamels of the character used, the coloring matter is in solution; in enamels carrying pigment color, the coloring matter is in suspension. In black enamels the gravity is definite; in colored enamels the reverse is the condition, the pigment being much heavier than the vehicle from which the color is suspended. The consideration, therefore, was how to control colored enamels to an even and perfect flow over large and irregular surfaces.

Spray Coating Unsatisfactory

The same method of application of colored enamels to automobile bodies was attempted by projecting or spraying in thin atomized form, as practiced in many industries upon smaller objects.

Obviously it is out of the question to dip the automobile body, as practiced in the metal industry for the coating of many articles. Spraying or attaching the enamel to the automobile body was not satisfactory, owing to the irregular surface or mottled effect. The flowing of the enamels under pressure was tried with only partial success. Special apparatus was developed and installed by some of the motor plants, but after a time was discarded for reasons of unsatisfactory finish. Satisfactory results were obtained in the first two, three or four coatings, but the flowed off material that had undergone physical changes resulted in the enamel becoming heavy, partially oxidized, and irregular results, such as sags, curtains and heavy beads, forming. This result required much rubbing and, due to the heavier film, the enamel was but surface dried. The net result was that the finish was unsatisfactory, did not compare to the built up air-dried or low bake finish as customarily followed and the systems were thrown out or discontinued for lack of economy.

The success of flow coating enamels was, and is, dependent upon a combination of elements: in the manufacture of the enamels the selection of especially made vehicles in which to float or carry the pigment; the elimination of drying agents that would retard flow and cause too rapid setting of the enamel; a proper balance of the color to give the desired opacity or hiding property without precipitating from the vehicle; and lastly, enamel that would not take on too great an excess of body or viscosity after having flowed off the surface upon which it had been applied and which enamel could be re-flowed without sags, curtains or heavy beads. From a manufacturing standpoint this presented some difficulties and there are some deficiencies or weaknesses still to be worked out.

Uniform Temperature Conditions Required

Other important considerations are more of a local character in the plant and the equipment necessary to obtain satisfactory results. The temperature of the room in which the enamel is to be flowed should be uniform and be maintained between 80° and 90° at all times. The period for flow of the enamel before placing the enameled body into the oven is important to final results and the gradual application of heat within the drying compartment is very important.

The writer can account for much of the satisfactory result at the Olds Motor Works in the splendid system and new ovens as installed by the Drying System, Inc., Chicago, and the application and control of the heat within the oven as contributing much to the final result. The maximum reached in the baking cycle of the primer and undercoat of 360°, and upon the final coat of 275° F. if applied in the earlier or first stages of the body entering the oven obviously would defeat the purposes desired.

In the preparation of the vehicle from which the enamel is made, oil as the life of all paints, varnishes or protective coatings is the important factor. Oil, known commercially as China wood oil, has been used by the varnish manufacturer for years and it might be said that 70% of all varnishes made contain China wood oil in varying proportions. China wood oil is not a substitute for linseed in any sense. It is entirely different in its characteristics and its value from a dollar and cents standpoint at present market is about double that of linseed oil.

China Is Source of Supply

The present source from which it comes is the low hill districts in central China, known as Szechwan Province, which is rated to be the richest province of China and the most inaccessible. Its population is estimated at 40,000,000 in a very fertile country without a mile of railroad. Access to this province is by the Yangtze Kiang River through the Gorges. All wood oil imported from China is produced by natives in small quantities and is extracted from the tung nut by use of crude hand power presses. There are no large crushing or producing plants in Hankow.

The tung tree grows wild and is a native of that section of China. The nuts run 3 or 4 to a pod of a diameter of 1½ to 2 inches. About 50% of the nut kernel results in oil. The meat of the nut is poisonous but is a good fertilizer. In this respect it differs greatly from flax seed (from which linseed is extracted) in that the flax cake is of equal importance, due to its nutritious and fattening value for live stock.

Tung nuts are collected by natives of the section. They are brought into small centers and representatives of the large dealers in the big towns go through the country and buy up the small supplies. The oil is then purchased by

the larger dealers, who in turn transport it to Hankow (which is the principal and chief exporting point from China) located over 700 miles from the sea. American importers have their warehouses (called "godowns") in Hankow and ocean going vessels of lighter draft make this port. In Hankow the oil is purchased by Chinese dealers or brokers who speculate in wood oil. These brokers or dealers in turn sell it to compradores of foreign exporting firms located there. It is stated that wood oil passes through as many as ten different hands from the producer to the actual exporter in Hankow.

Foreigners cannot own land in China and they are not permitted in the Szechwan district. Their lives would be in jeopardy if they went and therefore none of the exporters attempt to do any of their own producing or even have any control of it. The unsettled condition and lack of central governmental control in China in the past year or more has resulted in wood oil being stolen or confiscated by marauding bands of Chinese and by the many pirates who infest the rivers above Hankow. The difficulties of transportation in China have interfered so greatly with the bringing of wood oil into the hands of the American exporters in Hankow that it has resulted in a high price, although it has been said the Chinaman has learned that the American will pay the price and therefore have held wood oil out of the market. At any rate, oil is almost as high today (with innumerable boats to move it), as it was during the war when there were few, if any, boats to bring it over.

Oil Is Base of Chinese Lacquers

Wood oil has been used for ages by the Chinese. In fact, it is stated that successive applications of wood oil, given a long time to dry and each coat rubbed down thoroughly, is the secret of the Chinese lacquer ware that has stood for ages. The Chinese have also used wood oil for patching their sampans much as the American uses pitch for all purposes upon boats.

The characteristic of China wood oil is its hard drying, weather and water resisting properties as compared to linseed (the film of which dries soft and with a greater depth or fullness), which is not impervious to moisture or water. All of the principal brands of spar varnish on the market today are made entirely from China wood oil.

The method of preparing the enamels for the automobile industry is similar to that of other color grindings as practiced by all of the manufacturers in the color varnish and enamel line. There is no particular secret, other than in the preparation of the vehicle, to serve the purpose of flow and of incorporating the pigment into a smooth liquid that, when applied upon the metal surface of the automobile body, has good hiding properties, imparts depth of color, fills in the voids or small imperfections in the metal and is not materially affected by the high heat to which the enamel is subjected in the baking or hardening operation. This is purely one of manufacturing practice, of proportion and balance of the various raw materials used to accomplish the result desired.

IN reading a paper on "Water-cooled Aero-engines" before the Institution of Automobile Engineers, A. J. Rowledge said it could be claimed that all the great performances in the air had been accomplished by machines fitted with water-cooled engines. Furthermore, one might expect that it would always be possible to build a faster machine with a water-cooled engine than with an air-cooled one. On a weight basis, the water-cooled engine was almost as good as the air-cooled, while on a power and reliability basis it scored over the air-cooled engine.

Contends Used Cars Can Be Made Dealer's Biggest Asset

Cleveland expert believes substantial profits will be lost if handling of them is divorced from sale of new products. Bases his theory upon economic tenets. Demand must be created by use of intelligent selling methods. Cooperative effort is helpful.

By Edward Payton

ONE of our trade journals recently carried an editorial calling for economic advisers to our industry. In view of the economic fallacies that are advanced to the automobile trade from time to time the suggestion would seem to be a sound one. Chasing rainbows, the oldest occupation of man, is still indulged in. Automobile men are no exception and a goodly number of rainbows are still in sight.

Perhaps one of the first questions an economic adviser would be asked to discuss is the ever present used car.

Many decry it as the used car "evil," the greatest liability of the industry, a liability that should be removed from the dealer's business at all costs, quickly. It is pointed out that the removal will eliminate dealer losses due to competitive and unwise buying, conditioning expense, selling expense and what not. It is freely conceded that these losses are in a large measure the result of fear and of unwise management. To eliminate them by taking the used cars out of the dealer's establishment, or by refusing to trade used cars at all is, however, a rather radical step and has certain economic aspects worthy of our very serious study. Without thought of nominating myself as an economic adviser some of these factors are discussed below.

In "Economics of the Hour," by Strachey, we find the following economic aphorisms or maxims:

"Wealth consists of everything which has the quality of exchangeability." The used car being an exchangeable commodity, it must be wealth. We possess 15,000,000 of them in this country. Can we estimate the wealth of buying power inherent in these cars used as a medium of exchange?

"By increasing exchanges we increase wealth."

"By diminishing exchanges, through forbidding or impeding them, we diminish wealth." Yet it is on occasion seriously proposed to impede, or even to forbid the quality of exchangeability to the used car, at least insofar as the dealer is concerned.

"Those whose aim it is to increase the wealth (or

profit) of a nation will therefore never forbid or interfere with exchanges."

"There are things more important than wealth (or profit)."

"Therefore it is possible that the demand to interfere with or forbid, and thus diminish, exchange may be a sound policy, even though it diminishes wealth (or profit) and thus involves economic waste."

"What is CERTAIN is that to interfere with or forbid exchanges, not on moral grounds, but on the plea that it will increase wealth (or profit) MUST ALWAYS BE FALLACIOUS."

"Every demand for interference with exchanges must therefore be REJECTED if it is made on the ground that it will INCREASE WEALTH. Only if the demand is made on moral or social grounds can it be entertained. Then it must be judged on its merits."

A study of these maxims makes clear the reason for outlawing opium as a medium of exchange. The use of such narcotics is morally bad. The slave trade, dealing in human beings as a medium of exchange, as a means for the creation of wealth and profit, was also

forbidden for sound moral reasons. But to my mind there is no such reason existent for restricting the use of a motor car as an exchange medium.

Analysis of these maxims given by Strachey shows them to be wise and just, founded on the common sense of nations and centuries of experience. Applying them to our business we see that the 15,000,000 automobiles in the hands of present day owners ARE THE GREATEST ASSET THIS INDUSTRY POSSESSES. No matter what kind of an automobile a man may own he is in possession of wealth of some value which has the quality of exchangeability. He has at least the small part of the purchase price that may be applied or exchanged toward a new car. He has a further asset to this industry in that he is receptive to our market. Having once owned individual transportation in the shape of a motor car, he has no desire to go back to walking.

THE author of this thoughtful article, which is worthy the study of all factory executives interested in the solution of dealer problems, is manager of the Merchandising Department of the Cleveland Used Car Bureau. He has had much to do with working out the details of the "green seal" plan under which all used cars are reconditioned and then sold at their actual value with as strong a guarantee as is given with new merchandise. He also is responsible for the cooperative display advertising of used cars by dealers. This advertising has created a strong demand for these "proved and tested" automobiles.

The Cleveland plan is recommended by the National Automobile Dealers Association.

Can the dealer body of this industry really afford to forbid, impede or artificially restrict the free flow of this great asset as a medium of exchange? Of course, the dealer should make a profit when the used car is handled as an exchange medium. Govern the transaction by the use of sound business sense. Remember that the responsibility of the dealer is to the man who BUYS the traded car, not to the man who trades it to the dealer. But place no further, no artificial, restraints on exchanges. Read the maxims. Only by increasing exchanges can we increase wealth or profit. **PRODUCTS ARE ALWAYS BUYING POWER.** Shall we brand as an "evil" the buying power represented by 15,000,000 motor cars and kick them out of our establishments and our business?

Again we hear some of the prophets preaching the grave danger of over-production. The claim is made that our industry is growing too rapidly; that it is a drain on the public purse; that not only are too many used cars available, but too many new cars as well. Some claims are made that only by the limitation of supply, by the creation of scarcity, can the value of used cars be established and national prosperity enhanced.

That such claims are given a hearing leads me to believe that some in our industry labor under a misconception as to the *CAUSES OF VALUE*. We have been taught that value depends on difficulty of attainment, or scarcity. This is only one, the MINOR, of two elements that determine value. To make used cars more difficult of attainment through limitation of supply (a way of restricting exchange) has lately been stressed at the expense of that other and greater element in the creation of value—**DEMAND.** Demand is in truth the essential prerequisite of value, the *causa causans* of value. No matter how limited the supply of any product, there is no value without demand.

Wrong Emphasis in Theory of Value

Again let Strachey throw light in a dark place. He says: "Humanity has prayed for plenty since the beginning of recorded time. Yet always schemes are proposed for the limitation of production or supply, therefore the negation of plenty. We work for abundance with one hand and strive for limitation or scarcity with the other. What is this? How has a situation so mad arisen? Because mankind has adopted a theory of value imperfectly presented and therefore misleading. Men of the future may even say that this imperfection of statement WAS THE GREATEST SOURCE OF HUMAN DISASTER AND MISERY AND THE GREATEST IMPEDIMENT TO MATERIAL AND ECONOMIC PROGRESS IN OUR EPOCH. Owing to the wrong emphasis upon ONE of the terms in the theory of value, mankind has been led upon a false scent."

"The two things that must be present to give value are demand and the limitation of supply. Such is the theory of value, sound in itself, on which mankind has built up its practice as well as its economic ideas."

"Yet in this statement, apparently so innocent, lies a deceitful spirit, ready to whisper in man's ear that the quick way to increase the price of anything is to limit supply, i.e., to increase scarcity. It tells him to get WEALTH out of DEARTH."

"Pestilence and hunger may have slain their thousands, but in very truth this misstatement has slain its tens of thousands. It is the tragedy of economics. Yet the abstract statement is correct. All that was wanted to make it adequate was to place the emphasis on the positive term DEMAND, to insist that without demand there is no value, that limitation of supply alone can never give value. In six words—**VALUE IS THE DAUGHTER OF DEMAND.** The moment a thing is demanded its has

value. That which no man wants, however strange or rare, or even useful if men would only use it, has no value. That is the teaching of all human experience. That is the fact."

Demand Must Be Created

That DEMAND is the horse upon which we must place our money is shown in the clearest way in all modern commerce. Every dealer will readily admit that certain used cars taken in exchange possess the qualities of quick exchangeability and high market value in proportion to original list price. What brought about these qualities? Always the creation of DEMAND, never the limitation of supply. Conversely, the slower moving used cars, of lower proportionate exchange value, are always those of a more limited supply for which no value has been established through the creation of widespread demand. Every dealer knows this. Every dealer knows that certain cars did not gain their qualities of exchangeability and value through the restriction of output, but through the creation of demand. The same is true of products in every other field. All marketing experience as well as economic teaching brings us to realize that if we want to get the best price for anything we must create demand for it. Merely producing a thing, or even producing it cheaply, is no good unless demand is set going.

In spite of this experience, in spite of this teaching, there has been little organized effort to create demand for the used car. Dealers look on unconcernedly while so-called "gymps" aid in bringing disrepute to this rapidly growing branch of our business. Owners gain impressions of motor cars and of "used car departments" from dealers and from cars not capable of transmitting a representative impression. The writing of used car advertising is in large measure left to mechanics who are no doubt good ones. After the advertisement is written it is carefully hidden away in the back part of the newspapers. The tone of the greater part of this advertising is "grab it and git." Dealers strive to see who can yell the loudest in weird type and set up.

Practically no organized effort is being made to create demand for the used car as such, as an article of merchandise worth present day prices, worthy of the purchaser's dollars and confidence. Yet it is through the creation of this demand that value must come to the used car. With few exceptions no standards have been created; no unbiased grading has been done; no brands have been developed for the used car. Any concerted action that has been taken has usually pointed to the restriction of exchange rather than toward the creation of demand. And we have seen that the restriction of exchange is the fallacious method.

Surplus in Production Needed

For the further enlightenment of those who feel that we are producing more used cars than it is possible for our public to buy, more than the country desires to acquire, let us make use of the clarifying powers of the interrogative and ask two questions:

1—Is it possible for man to produce more than man is able to buy?

Mr. Hull in his "Industrial Depressions" says: "The members of an uncivilized tribe, each of whom produces only what is necessarily consumed in the daily maintenance of existence, possesses nothing with which to buy the products of others. Under these conditions wealth and buying power do not exist in that community. But when each member of the tribe produces something of value in excess of his daily necessities, something desired by another, then each has something with which to buy the products of the others. Then the production of wealth

(remember the definition of wealth), the creation of buying power, has commenced in that tribe."

In other words, PRODUCTS ARE BUYING POWER. Money is only the medium by which products are exchanged. Where is the buying power inherent in our 15,000,000 used cars most likely to come? To our automobile dealers, of course.

John Stuart Mill says: "Could we suddenly double the productive powers of the country we should double the supply of commodities in every market; but we should by the same stroke double the purchasing power. Everybody would bring a double demand, as well as supply. Everybody would be able to buy twice as much because everybody would have twice as much to offer in exchange."

Professor Cairnes says: "Purchasing power, in the last resort, owes its existence to the production of commodities."

W. Stanley Jevons says: "It is absurd to suppose that people can become wealthy by having less wealth; to become wealthy we must make more wealth."

Wealth Depends Upon Output

And remember that "wealth" consists of everything that has the quality of exchangeability. Thus the opinion of these economists seems to be that man is not likely to produce more than he is able to buy. May we not safely conclude that the used cars in the hands of owners make up a tremendous amount of wealth; that they are an asset to the industry of huge proportions and never a liability unless made so by unwise handling? Is not the great strides the automobile industry has been able to make in a short space due in some measure at least to the *buying power represented by the used cars that have been traded in*? Economists more learned than I seem to have answered our first question.

2—Is it possible for man to produce more than man desires to acquire?

Again quoting Professor Jevons: "There can never be, among civilized nations, so much wealth that people would cease to wish for more. However much we may manage to produce, there are still many other things we wish to acquire."

We all know that there is no limit to human desires. Every man who owns a motor car, a house or a factory would like to own a larger and a better one. The man who controls a bank would like to control a number of banks; having gained these, he would like to control railway systems, steamship lines, coal mines, etc. *Man's desires increase with his wealth.* And the wealth of the nation is constantly increasing. Whatever one man achieves in wealth and power, others will desire to achieve and will strive for.

Used Cars Extend Market

Though the average wealth of the individual in this country has increased 1000 per cent in three-quarters of a century, no man is yet so gorged with possessions that he desires no more. Should the time ever come when the poorest in our land enjoy the luxuries now possible only to the richest, there would still be desire for more wealth. The constant increase in the number of used cars available for trade has brought into the market a buying power that has been a very powerful stimulant in the sale of new cars. Even yet not over one human being in twenty has what might be called all the reasonable comforts and conveniences of life.

The luxuries and comforts of today were not even imagined a century ago. Perhaps we today do not conceive what the public may be able to absorb in the way of transportation as the years go by. The desire for gain, to possess wealth, transport, power, is a natural instinct im-

planted in man's breast by his Creator. It is as strong in a man or a nation after possessions have increased a hundred-fold as it was when accumulation started.

If it is impossible for man to produce more than man is able to buy (and such would seem to be the conclusions of economists) or more than man desires to acquire, our fears of over-production fall to the ground.

May we not, with marketing experience and economic teaching to guide us, safely conclude that the millions of used cars now in the hands of owners make up the greatest asset of the industry? May we not also safely assume that the use of individual transportation is going to increase as the wealth of the nation increases? And that an ever-increasing number of used cars, making up an ever-increasing volume of new car purchasing power, will be offered to dealers each year.

May we not also safely believe that the possibility of profit to the dealer, full exchange value to the owner, and full utility value to the purchasers of used cars is going to be enhanced by *the creation of demand* for used cars, and not by limitation of supply or restriction of the exchange function? And if our conclusions are warranted, should any action that will tend to throw the used cars out of the dealer's establishment be hastily taken?

And if the dealers do decide to retain their control of the used car business because of new car buying power and market receptivity involved, it naturally follows that means for the creation of demand, for the securing of a profit on used car transactions, should be created.

Then the dealer body should give the used car the same intelligent handling given any commodity for which demand must be created. First of all create used car standards, for lack of demand usually indicates lack of standards. Create an inspection service to see that these standards are maintained or bettered. Identify this standard product by brand or trade mark, setting it out and above similar, but uninspected and unidentified, products. Then merchandise, advertise, create a demand for this brand.

Cooperative Effort Urged

No less an authority than Robert Ruxton says in the "Printing Art" for November: "Is your product common? Then give it a special name and *switch the tremendous common demand*, to your special product. Conditions existing today simply invite some fortunate pioneer to apply the match of advertising to the bonfire of opportunity."

Are not used cars our common product? Does not the overwhelming demand for low priced new cars prove the existent common demand for transportation in the average used car price class? Surely the dealer body can apply the match of merchandising effort to their bonfire of opportunity.

Granted that this effort should be a cooperative one, the highway of method has been built and mapped. To quote just one instance of such effort, the paint folks have in the space of three years DOUBLED the demand for their product with their cooperative "Save the Surface" campaign.

Restriction of exchange or limitation of supply always works toward the restriction of wealth or profit. Toward unimpeded exchange and CREATION OF DEMAND is the road to more business, more wealth and more profit. Let us not regard our great asset as an "evil."

Let us proceed carefully before throwing out of our existing organizations the buying power, the marketing receptivity, locked up in the millions of motor cars now running and other millions soon to be. At least let us make no such move without due consideration of all the factors involved. Rather let us prepare to make the greatest possible use of this great asset already with us and create the means to handle it profitably.

United We'll Win, Divided We'll Fail, on Excise Tax Removal

Discriminatory levies will neither be lifted nor cut unless motorists of nation impress their power upon political sense of Congress. Vigorous and concerted action is imperative NOW.

THE automotive industry, which probably has been preponderantly Republican in its political affiliations in the past, now finds itself in the rather odd position of having its interests sponsored by Democrats in Congress and spurned by representatives of the party to which it has given its major support. The situation has arisen because of the measures introduced by Representative Clancy (Dem.) of Michigan for repeal of the excise taxes on automotive products. These bills have been indorsed by the minority members of the Ways and Means Committee, but have aroused little sympathy in the hearts of the majority members.

Any one familiar with the history of Federal taxation knows that it usually has been framed with two purposes in mind:

1. To raise the requisite amount of revenue.
2. To arouse the animosity of as few people as possible,

Except in a relatively few cases politics have been the prime consideration. All too often the money needed to run the Government has been determined to a considerable extent by the effect certain appropriations might have on the political fortunes of representatives of the party which happened to be in power. When the amount has been decided upon, tax bills have been so framed that they would hit those persons whose squirming would cause the least turmoil.

The "solons" who "represent" us at Washington are laboring under at least two obsessions. One is that life must be made as easy as possible for the farmer, because he exerts a tremendous political influence, and another that the motorist is an easy mark who will pay whatever may be levied against him without raising lamentations which can be heard on Capitol Hill.

Up to this time, at least, their diagnosis of the situation has been fairly accurate. Motorists have been "good sports" and they haven't been organized for direct political action. They have grumbled a bit among themselves, but they have gone right on paying all the taxes Congress, State legislatures and municipalities have seen fit to impose on them without making their resentment felt at the polls.

Politicians never have outgrown the theory that any one able to own an automobile must be well-to-do, if not wealthy. Motor car owners themselves have been partly to blame for this prejudice. All too often they have

given the impression that they merely were "keeping up with the Joneses." They went to the theater and laughed heartily a couple of years ago at a play which was built around this ridiculous idea.

But with 15,000,000 motor vehicles in use and with only 10,000,000 persons admitting incomes of as much as \$1,500 a year, it is evident that the motor car has ceased to be the toy only of those who are vulgarly rich. Sooner or later this fact will percolate through the consciousness even of legislators who cling to an old idea longer than a dog to a bone.

Motorists Are Not Organized

If the motorists of the country were organized into non-partisan political clubs to battle for their rights at the ballot box, they would be the strongest political influence in the land. They haven't done it yet, but they will unless Congress and State legislatures soon awaken to a reasonable comprehension of what is and is not fair.

The automotive industry, as an industry, has kept out of politics. It has accepted meekly the slings and arrows of outrageous political fortune, conducting itself quietly, courageously and patriotically. It made no complaint about excise taxes which were imposed as a war measure when they were placed on many other industries as well, although it did object to having its products classed as luxuries. In the post armistice days it protested only half heartedly against the retention of these excise taxes when those which affected only luxuries were being repealed.

Now, however, when virtually all other excise taxes are to be repealed and those levied against it retained, it is becoming thoroughly aroused and it is beginning to fight vigorously, as it should have done months ago. It is not yet too late, but valuable time has been lost.

The unkindest cut of all has come from Senator Couzens, who made his millions in automobiles. He asserted on the floor of the Senate, although he now professes not to remember it, the statement that automobile manufacturers were much more interested in having their income surtaxes reduced than in having the excise levies against their products removed or reduced. It is quite true that they haven't paid this tax themselves and have added it to the retail price of the goods they sell, but exactly the same procedure has been followed by every other manufacturer. In most cases, however, they would profit more in the long run by the repeal of these unjust and discriminatory levies than they would by as much of a cut as they are likely to get in their surtaxes.

Secretary of the Treasury Mellon found ample economic justification for his income tax reduction plan. The cuts he proposed in surtaxes undoubtedly would add new inspiration to business and any which may be made will be helpful. Lower normal taxes also will be welcome to every one with an income big enough to require a contribution to the Government.

Federal Automotive Excise Tax Bill

	1921	1922	1923
Cars	\$51,237,358	\$69,856,599	\$106,280,234
Trucks	8,245,404	9,583,211	10,908,777
Parts and tires.	40,484,660	35,353,589	38,610,844
Total by years.	\$99,967,422	\$114,793,400	\$155,799,855
Grand total for three years,	\$370,560,677.		

Congress, however, paid little heed to the economic phases of the proposal. What did intrigue the members of both houses was the idea that several million voters could be relieved of some of their tax burdens. There never has been any question about acceptance with virtual unanimity of the suggestion that the normal rate can be cut. Surtaxes don't make so much difference, from a political point of view, because comparatively few people have to pay them. The political rather than the economic effects of taxation are what count most at this particular time.

What Congress Can't Visualize

If Congress could visualize 15,000,000 motor vehicle users as a political unit which would display at the polls resentment against excise taxes which are obviously unfair, there would be no question about their repeal. Motorists, en masse, never have been thrust upon the political consciousness of legislators, however. That is the reason the excise taxes on automotive products are being retained while virtually all others are being removed.

Here is a list, compiled by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, of the "nuisance taxes" which are to be repealed together with the amount of revenue they bring in:

Telegraph and telephone messages, \$29,188,337; leased wires, \$1,192,446; cereal beverages, \$3,624,402; fruit juices, \$442,128; still drinks, \$199,381; mineral waters, \$204,037; fountain syrups, \$4,283,895; carbonic acid gas, \$1,378,051.

Admissions under 50 cents, \$33,000,000; candy, \$11,315,465; hunting and bowie knives, \$30,455; dirks, knives, daggers, etc., \$1,051; liveries and livery boots and hats, 138,233; hunting and shooting garments, \$168,274; yachts and motor boats, \$267,079; carpets and rugs, \$928,809; trunks, \$46,610; valises, \$34,008; purses, pocket books, etc., \$151,105.

Portable light fixtures, \$229,575; fans, \$11,081; jewelry, \$10,000,000; theater seating tax, \$1,712,656; circuses, \$13,966; public exhibitions and entertainments, \$138,655; bowling and billiards cut one-half, \$1,185,546; stamp tax on produce sales cut one-half, \$3,507,690, making a grand total of \$103,392,757.

When anyone interested in motor vehicles reads this list he either will swear or laugh.

Insistent Demand Necessary

Representative Clancy is making a yeoman fight for the passage of his bills, but the majority sentiment seems to be against him and he needs a lot of help from the outside if even a part of the excise taxes are to be removed. Appeals to the Ways and Means Committee were made by virtually every automotive organization, but they made little impression because the members could take the position that they were based upon selfish interests. Manufacturers get little sympathy because it is assumed they control relatively few votes.

Motorists themselves must make an insistent and irresistible demand before these imposts will be reduced or eliminated. It is unfortunate, therefore, that they cannot present a united front because there are two national organizations, one of which seems to be automatically opposed to whatever the other one advocates.

The language best understood by a member of Congress is a letter from a constituent demanding that he follow a certain course of action. If enough Congressmen get enough letters of this character they will take more seriously the obvious fact that automotive products and individual transportation are being discriminated against in taxation.

Neither the automotive industry nor motorists generally are asking favors and they never will. They are perfectly willing to pay their fair share of taxes. All they want is something resembling a square deal, which they never have had up to this time. If the Government actually needed the revenue they wouldn't object seriously to the payment of excise taxes, provided they were levied against other merchandise in general use and of an equally necessary character.

It is unfortunate that all the interests concerned could not have presented a united front and gone into action weeks ago. It may not be too late even now to get some relief if the fighting is sufficiently aggressive.

The situation which has arisen in relation to excise taxes provides further evidence of the need for some strong, compact body which can speak with authority not only for all branches of the automotive industry but for motorists as well. This body should be able to formulate recommendations which will be accepted without questions by the membership of the various organizations it will represent. There are subjects big enough to warrant the wiping out of comparatively trivial differences of opinion, usually based upon selfish considerations and excise taxation is one of them. J. D.

Cars to Traverse Sahara

Have 3 Axles and 12 Wheels

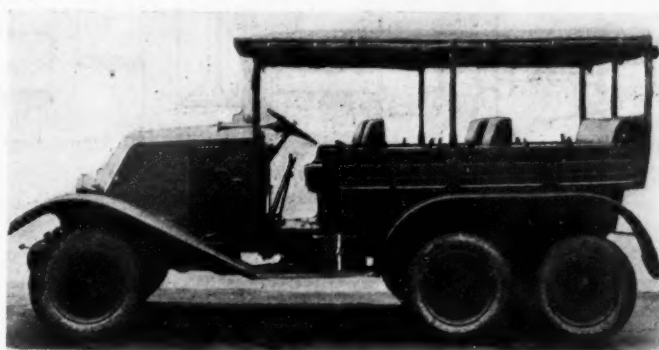
THREE-AXLE 12-wheel sight-seeing cars have been built by Renault for regular service in the Sahara Desert under the organization of the French Line Steamship Company. For several years this company has been running automobile services in the various portions of Algeria, Morocco and Tunisia open to normal cars, but with the new Renaults it intends to maintain complete cross Sahara trips.

The Renaults have a normal type four-cylinder engine of 75 by 120 mm. bore and stroke with radiator on the dashboard and thermo-siphon cooling. Clutch and gear set are normal, all the novelty of the car residing in the twin live axle.

A primary shaft driven from the propeller shaft is in engagement with a secondary shaft having a bevel gear at each end, the forward bevel being in engagement with the crown wheel on the front axle and the rear bevel with the crown wheel of the rear axle.

Dual steel disk wheels equipped with Michelin low-pressure balloon tires are used for both the drivers and the steerers. An engine-driven winding drum is mounted between the front dumb irons and accommodation is provided for six passengers exclusive of the driver.

On the initial trip into the Sahara the Renaults averaged 9 miles an hour, all stops included and maintained 30 miles an hour where track conditions were favorable.



Type of sightseeing car used in Sahara Desert

New 6-Cylinder 40-hp. Car Brought Out by Benz

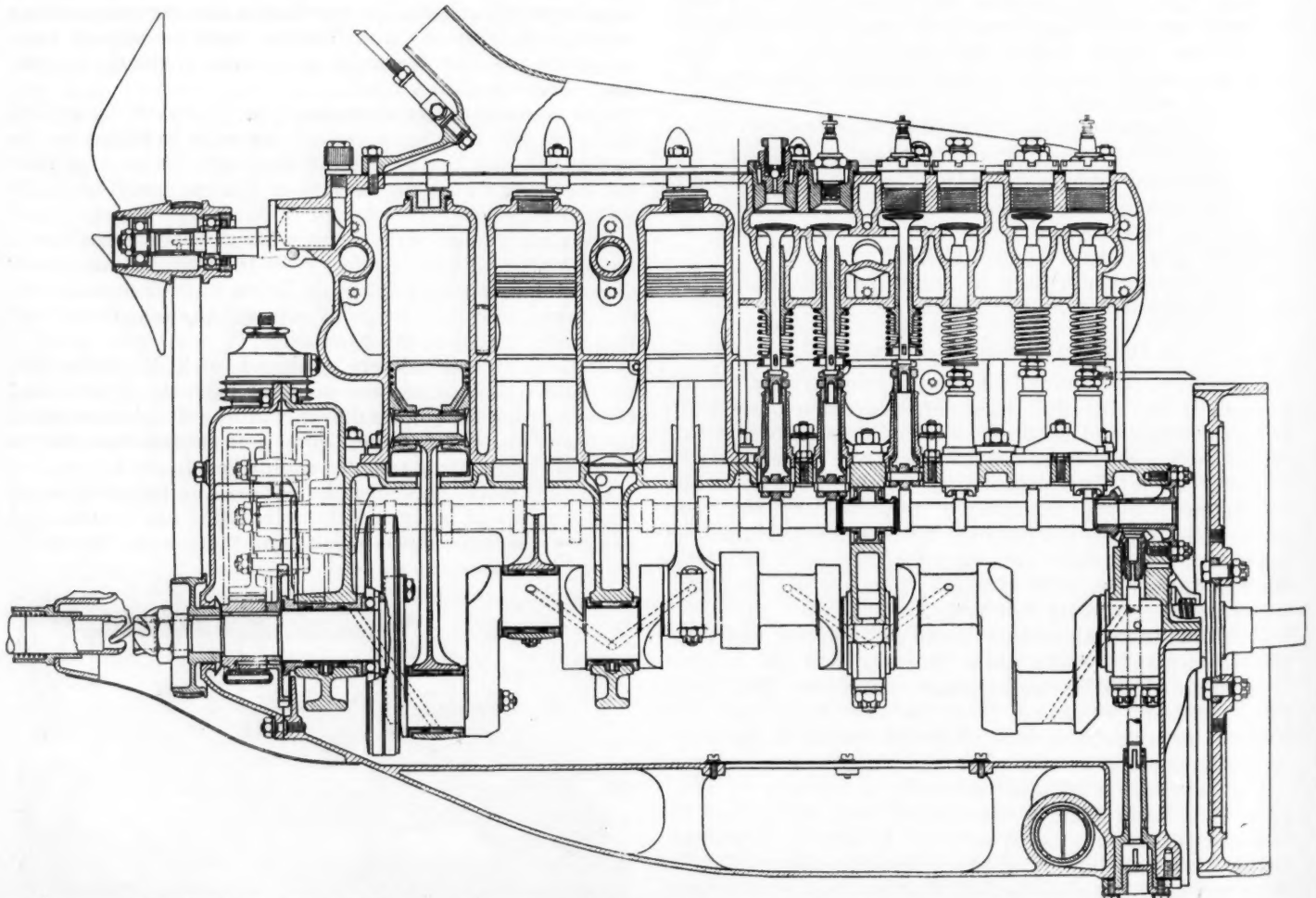
Engine is L-head type with 2 13/16 in. bore and 4 5/8 in. stroke. Radiator is V type. Oil tightness of the rear bearing on gear housing is secured in novel manner. Wheelbase is 129 in. and stripped chassis weighs 2200 lbs. Maximum speed is 53 m.p.h.

By Benno R. Dierfeld

THE Benz Company of Mannheim has brought out a new six-cylinder car having a 40-hp. rating. Its engine drives through a cone clutch to the four-speed transmission, which is mounted separately on the frame. There is only one universal joint in the propeller shaft and the drive to the rear axle is by bevel gears. Radius rods connecting the rear axle to the frame take the driving thrust. The steering post and control levers are arranged on the right-hand side. The foot brake acts on the transmission and the hand brake on the rear wheels. The frame is inswept in front and dropped at the rear. This general layout, which has been proved by many years of practice, has not been changed, and all of the innovations have to do with details of design.

As will be noted from the sectional views reproduced, the cylinders are cast in a block and with integral cylinder heads. They are of the L-head type, with a bore of 2 13/16 and a stroke of 4 5/8 in. The engine peaks at 2200 r.p.m., at which speed it is said to develop 40 hp. The displacement figures out to 172 cu. in. and the mean effective pressure at the speed of maximum output to 94 lb. per sq. in., which seems remarkably high.

The valves have heads of chrome nickel steel. They are operated by roller tappets with set screw and nut adjustment, and discs of fiber are inserted in the heads of the adjusting screws in order to insure silent operation. Silent chains are used for the camshaft and the magneto drive, and a separate chain drives the Bosch



Longitudinal section of Benz engine. (There appears to be a vibration damper inside the crankcase at the forward end)

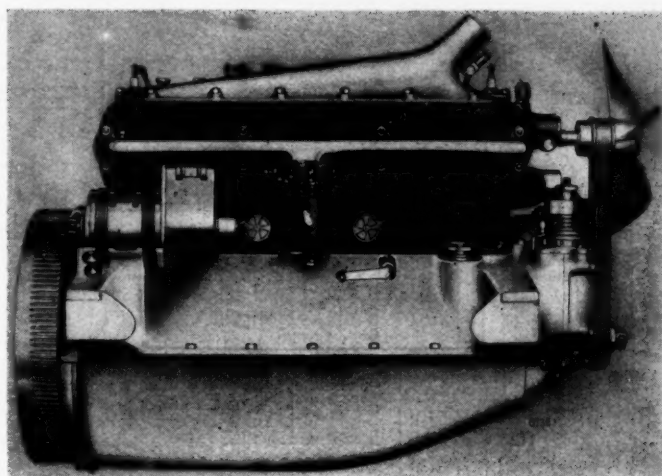
generator and ignition unit, which latter is mounted on the former. It is claimed that the camshaft drive can be easily adjusted from the forward end. The starting motor is located at the rear of the engine on the right and drives to the toothed flywheel in the usual manner.

Thermo-siphon Circulation

The cooling water is circulated through a V-type radiator by thermo-siphon action, ample water space being provided. A stay rod extends from the upper tank of the radiator to the water outlet fitting on top of the engine. There are water spaces between each pair of adjacent cylinders, and the jackets also are carried entirely around the valve seats. The radiator fan, which has the peculiar shape necessitated by the V form of the radiator, is cast of aluminum and has three blades. It is mounted on a ball-bearing stud or shaft and is driven by a flat belt from the forward end of the crankshaft. The supporting stud is eccentrically mounted in a boss cast on the cylinder block, which permits of ready adjustment of the belt tension.

The carbureter is a Zenith dual type, having a single float chamber for the two spraying chambers, each of the mixing chambers supplying three cylinders. This fitting being located on the side of the cylinder block opposite from the valves, the block is cast with four inlet passages, as may be seen from the longitudinal section. Passages at the ends of the block supply cylinders Nos. 1 and 6, while the other two supply two cylinders each.

Air for the carbureter is pre-heated by being drawn through a jacket on the exhaust manifold visible in the cross-section of the engine. From there it passes to the valve chamber, which is closed by two aluminum cover plates; thence through the spaces between adjacent cylinders into a chamber on the opposite side of the



Benz 40-hp. six-cylinder engine with carbureter and starting motor

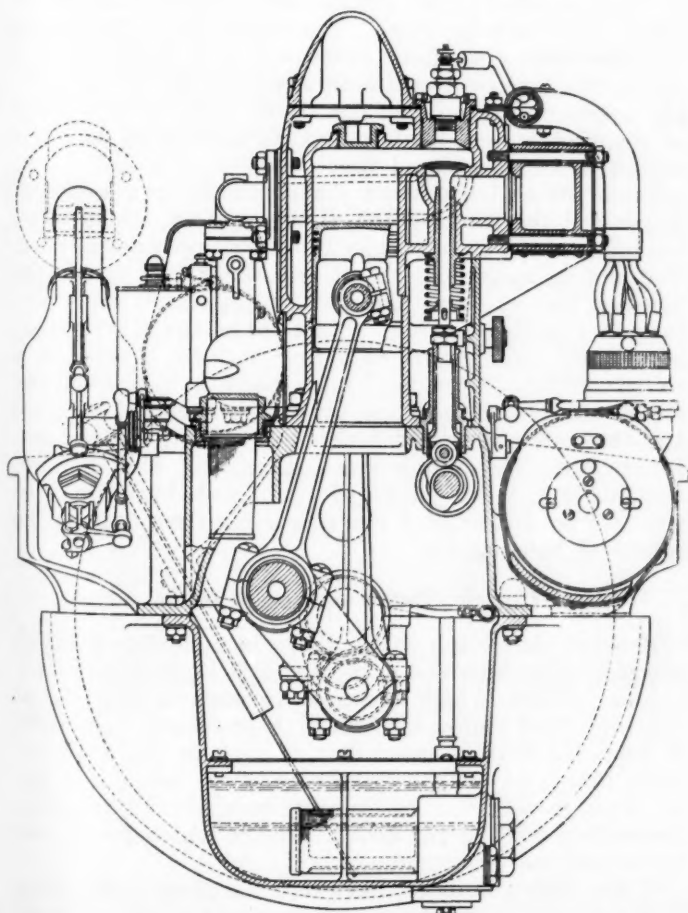
cylinder block below the water jacket, which has a sheet metal cover to which the carbureter air inlet is fastened. There are two register valves in this sheet metal cover, as may be seen in the photographic view of the engine, which serve for the admission and control of cold air. The small lever seen in the photograph just forward of the carbureter is mounted on a spark control shaft passing through the upper portion of the crankcase from the right side, where the steering post is located, to the left where a linkage connects from it to the ignition unit mounted on the generator. On the rear crankcase supporting arm may be seen the top of the spear type oil gage which is also shown in the sectional view of the engine. The oil filler is near the forward arm.

An interesting detail of the engine is the priming cup, which is screwed into the plug over the exhaust valve. This is a stock article and is manufactured by the Hansa Co. of Stuttgart. It consists of three parts, viz., a plug which is counterbored at its upper end and has a small central hole through its lower portion; a metal ball closing the passage through this plug and a cap which serves to hold the ball securely on its seat against the explosion pressure when the priming cup is not in use and which is unscrewed a few turns when it is desired to prime the engine. It is claimed for this priming cup that it obviates trouble from sticking cocks, that it is always compression-tight, as the ball rests between spherical seats, and that the compression will always lift the ball from its seat when the retaining cap is loosened. Fuel feed is by vacuum from a 15-gal. rear tank.

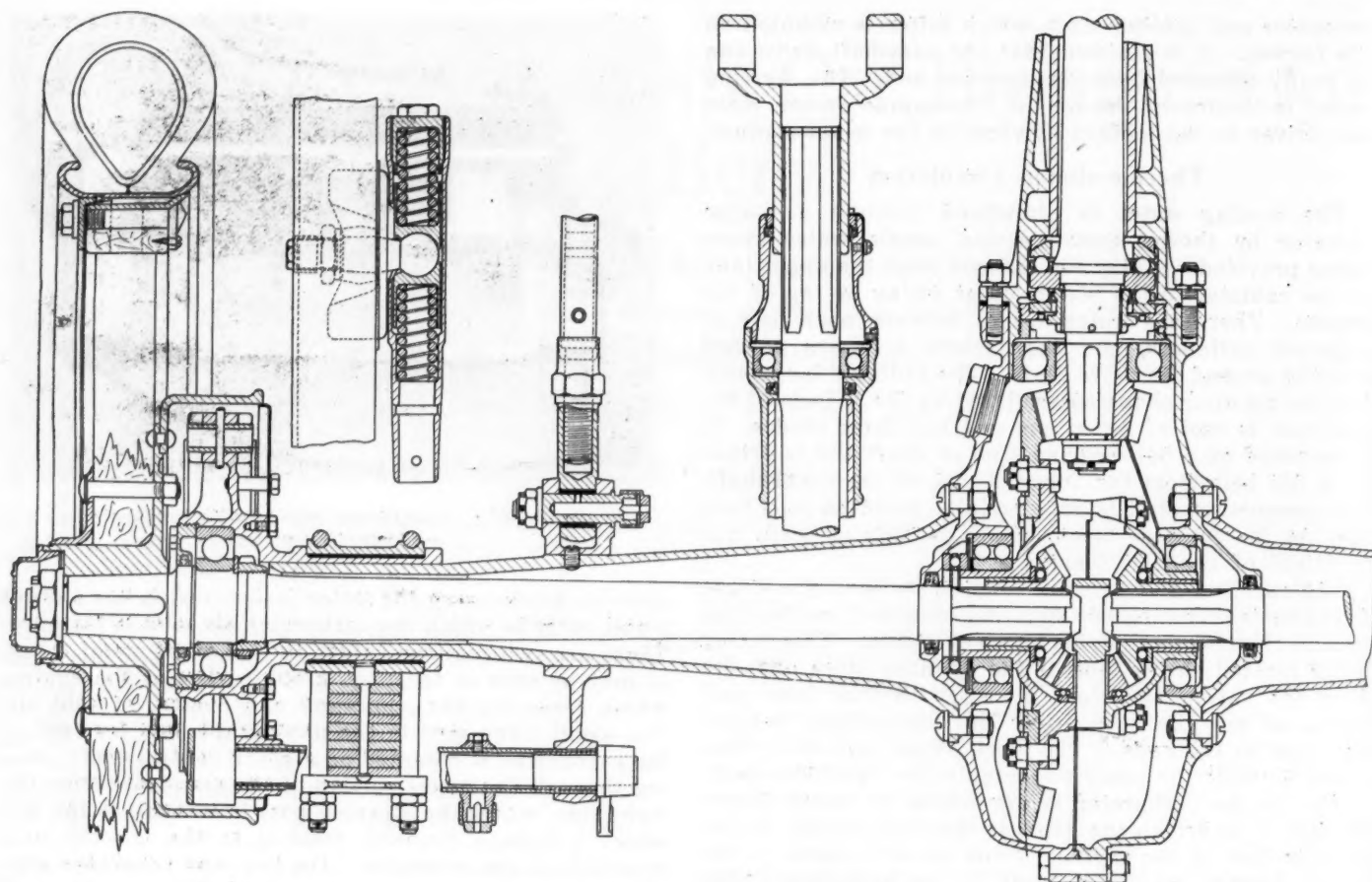
Heavy Bearing Supports and Caps

The aluminum crankcase is divided horizontally in the plane through the crankshaft axis, the upper half carrying the four crankshaft bearings. It will be noticed from the longitudinal section that the bearing supporting partitions or webs are of double or box-girder construction and that the bearing caps also are exceptionally heavy. Crankpin and crankshaft main bearings are substantially $1\frac{3}{4}$ in. in diameter, the former being 2 in. in length and the intermediately main bearings slightly less. The pistons are of cast iron.

Engine lubrication is by force feed to the main and connecting rod bearings, the oil being put under pressure by means of a vane type pump driven by bevel gears and a vertical shaft from the rear end of the camshaft. The pump, which is bolted into an opening in the bottom of the crankcase, draws oil from the sump through a large cylindrical strainer and delivers into a



Cross section of Benz engine

*Rear axle and propeller shaft assembly*

distributing tube running the length of the crankcase and fastened against the bottom of its upper half by clips. Branches from this distributor tube lead to the main bearings, and there are leads also to the generator and the chain housing. The pressure on the oil is indicated by a pressure gage on the dash. The Benz company continues the use of offset cylinders, the offset in this particular design being $\frac{3}{8}$ in. At the forward end of the crankshaft is a ball thrust bearing to take up end thrust.

The flywheel is of large diameter, but of comparatively light weight. To its web is bolted the driving member

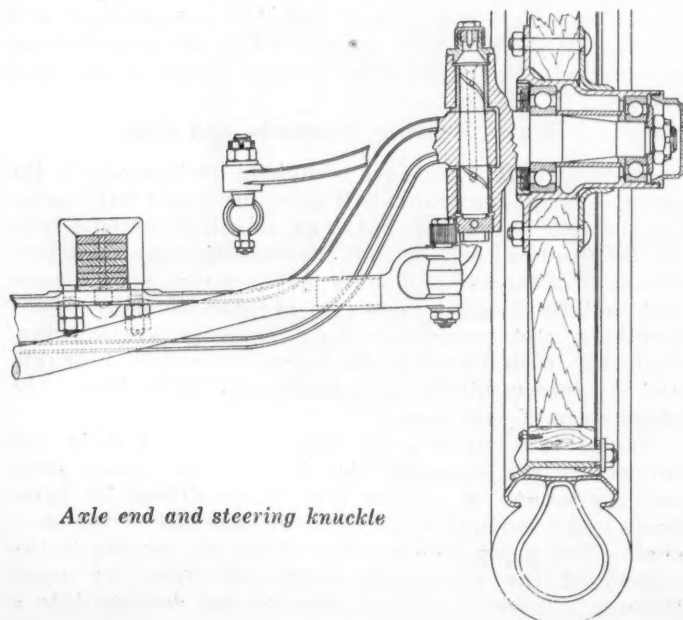
of the inverted cone clutch, the driven member of which is of pressed steel. The clutch is piloted inside a hollow extension of the crankshaft and the pilot bearing is lubricated automatically from the engine lubricating system. The lining of the clutch is of leather. Back of the clutch is a leather disk flexible joint which is surrounded by a pressed steel cover.

From the clutch a short shaft extends to a spherical housing at the forward end of the gearbox, which housing incloses the clutch brake and the shipper mechanism. The clutch brake consists of two cones just inside the housing, one of them fastened to the clutch shaft and the other to the housing. The cone on the clutch shaft is pressed against an adjusting nut by means of a coiled spring. When the clutch pedal is depressed the clutch shaft and the cone upon it are moved forward and the cone comes in contact with the stationary cone, which stops the clutch from spinning. The distance separating the two cones of the clutch brake may be adjusted by means of a nut accessible from outside the spherical housing.

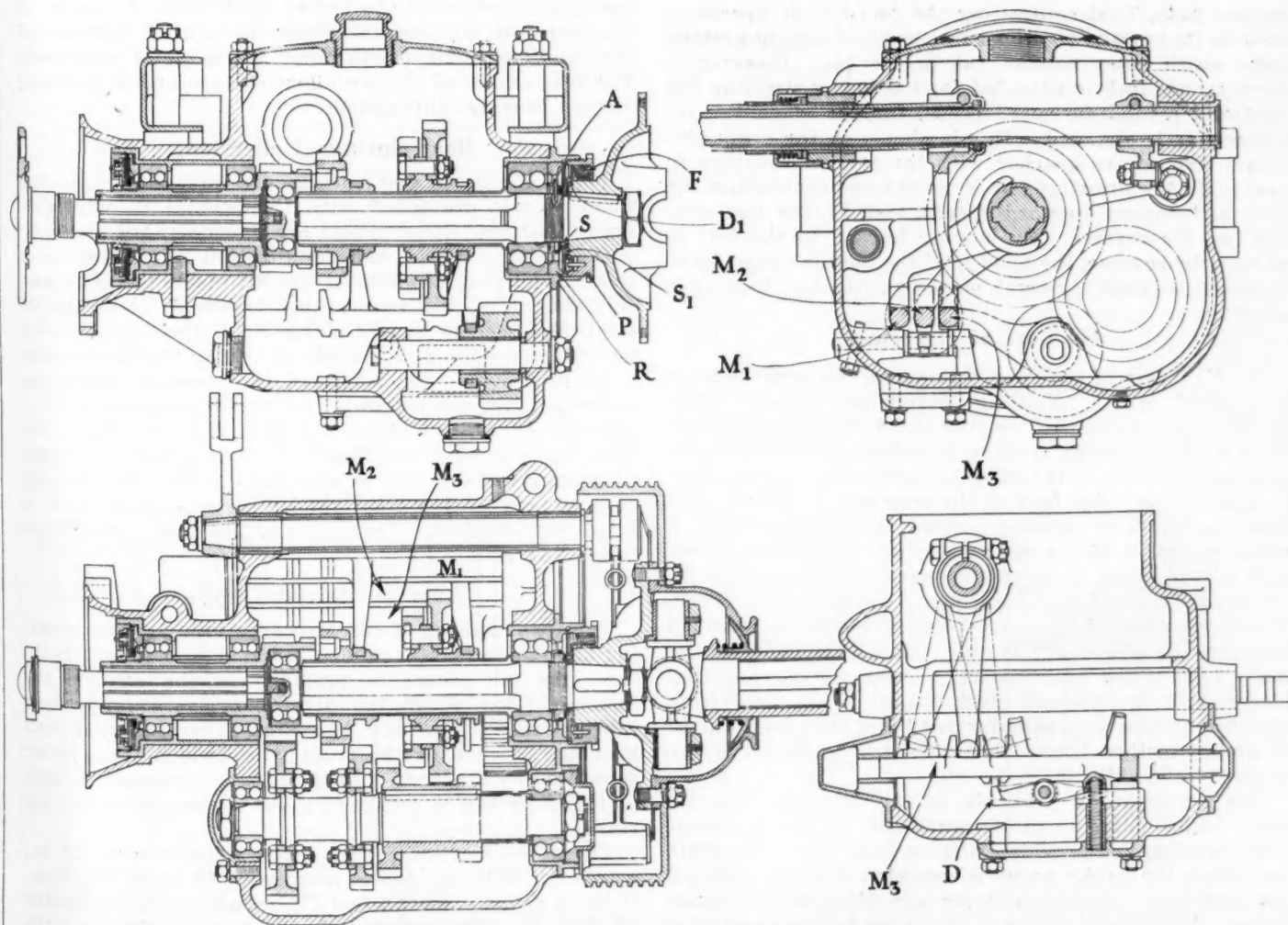
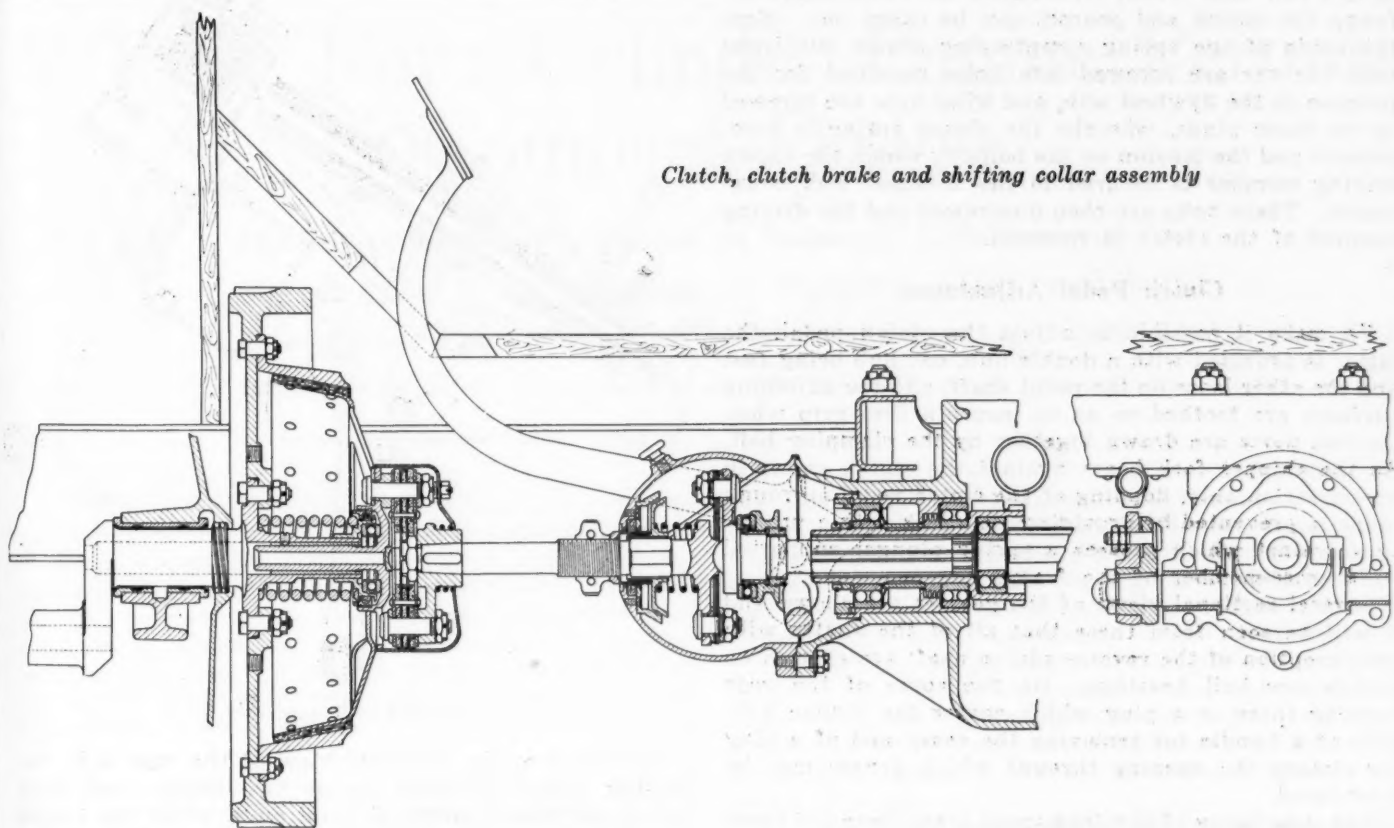
Clutch Throw-out Mechanism

Back of the clutch brake there is a flexible joint of the steel disk type, and back of this is located the clutch shipper collar, which operates through a ball thrust bearing. The ball-shaped housing inclosing these parts is provided with a cover that is held in place by two wing nuts and can be readily removed when it is desired to inspect the mechanism or make adjustments. There is a plug in the cover through which grease can be introduced.

If the clutch is to be taken out, the sheet metal cover over the leather disk joint and the cover of the spherical housing are first removed; then the bolts are taken out

*Axle end and steering knuckle*

Clutch, clutch brake and shifting collar assembly



Sectional views of the gearset and its shifting mechanism

of the two disk joints, whereupon the short shaft between the clutch and gearset can be taken out. Next the studs of the spring compressing device furnished with the car are screwed into holes provided for the purpose in the flywheel web, and wing nuts are screwed up on these studs, whereby the clutch spring is compressed and the tension on the bolts by which the clutch driving member is secured to the flywheel web is released. These bolts are then unscrewed and the driving member of the clutch is removed.

Clutch Pedal Adjustment

To make it possible to adjust the clutch pedal, the latter is provided with a double hub, one hub being fast and the other loose on the pedal shaft, and the adjoining surfaces are toothed so as to insure a firm grip when the two parts are drawn together by the clamping bolt. As the shipper fork bears against the clutch collar in one direction only, flopping of the clutch pedal on rough roads is prevented by providing its shank with a projection against which presses a spring plunger supported on a cross-member of the frame.

Several sectional views of the gearset are shown and it will be seen from these that all of the shafts with the exception of the reverse pinion shaft are carried on double row ball bearings. On the cover of the gear housing there is a plug which serves the double purpose of a handle for removing the cover and of a plug for closing the opening through which grease may be introduced.

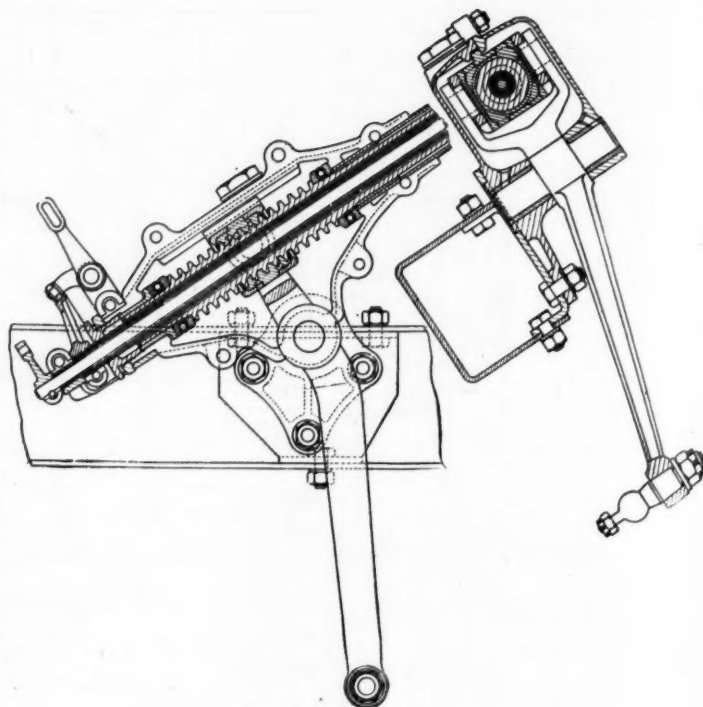
The gear being of the four-speed type, there are three shifter rods. That controlling the two higher speeds is held in its various positions by means of spring-pressed dogs which enter notches cut in the bar. However, a more secure lock is provided for the bar controlling the first and second forward speeds, for use when the reverse gear is engaged. This is shown in the cross sectional view of the gearbox with the control members in place. In the drawing, bar M^2 is the one controlling the first and second forward speeds and M^1 the one controlling the reverse. By moving bar M^1 to the left to engage the reverse, the pawl D of the double armed lever is forced between the teeth on the shifter bar, locking it securely.

Oil Seal of Gearcase

Oil tightness of the rear bearing on the gear housing is secured in the following interesting manner: Over the tailshaft is screwed the ring nut A, which is provided with a helical flange tending to return any oil into the gearcase and which is locked in position by a snap ring.

Against the outer face of the ring nut A bears a narrow washer S of chrome leather, and against this a wider washer S_1 of the same material. Against the inner part of the latter is forced the pressed steel washer D, by means of eight coiled springs F in the gland nut P. The outer edge of the large leather washer is clamped between the gland nut P and a spacer R, holding the outer race of the ball bearing in place in its mounting sleeve, and the pressed steel washer D, is held from rotating by means of pins fastened into the gland nut P. A similar method is used to render the front end of the housing oil-tight.

The transmission brake is of the internal type, its drum being bolted to the forward half of the universal joint housing and provided with cooling ribs. The shaft on which the brake pedal is mounted extends through the gearcase. Cast iron liners are fitted to the brake shoes. Adjustment of the brake is made by means of a small finger wheel accessible through an opening in the floorboard.



Steering gear assembly

Referring to the sectional view of the rear axle, the driving thrust is taken up on two radius rods with spring-cushioned spherical front ends, while the torque reaction comes on the propeller shaft tube. All parts of the rear axle housing, including the central differential case and two conical axle tubes, are made of cast steel. The rear axle is of the semi-floating type and is mounted on ball bearings throughout.

Rear Springs Underslung

The half-elliptic rear springs are underslung and the wood wheels are fitted with Continental demountable rims. The rear wheel brakes are internal; they are lined with asbestos fabric, and equalization is effected by a small bevel gear differential located inside the gearcase. Adjustment of the rear brakes is made by means of small handwheels located alongside of the gearcase and which are rendered accessible by lifting the floorboards.

As in previous Benz models, the steering gear comprises a long, unhardened steel screw surrounded by a nut cast of white metal. The design differs from previous ones in that the thread is of trapezoidal instead of square section, and is also finer. The nut consists of a square section steel shell with recesses, which is filled with babbitt. Throttle and spark levers are arranged as usual.

Axle of Mercedes Type

The front axle is of the Mercedes type and the steering knuckle has plain bronze bearings and thrust washers. An oil pocket is provided in the cap on the knuckle, from which the pivot bearings receive their lubrication. There are two single row annular ball bearings in each of the front wheel hubs, these being separated by a spacer, and the hub is rendered oil-tight on the inner end by means of a felt washer and retaining ring.

The new six-cylinder Benz has a wheelbase of 129 in., a tread of $53\frac{1}{8}$ in., and is fitted with 32 by $4\frac{3}{4}$ -in. tires. It has a ground clearance of $7\frac{5}{8}$ in. and a turning radius of $42\frac{1}{2}$ ft. The stripped chassis weighs 2200 lb.; the open six-passenger car, 3400 lb., and the maximum speed is 53 m.p.h.

V-Type Four Cylinder Engine Permits Compact Design

Difficult problems are involved in balance. Cylinders may be placed opposite to one another or staggered. Two crankshaft arrangements are possible with latter construction. Size of angle determines irregularity in the sequence of explosions.

By P. M. Heldt

A TYPE of engine that has met with a certain amount of favor on the part of European designers in recent years is a four-cylinder V engine in which the angle between the two intersecting planes containing the cylinder axes is made as small as possible. Such engines are particularly suitable for light cars designed for economical operation, and for taxicabs, for the reason that they are shorter than conventional four-cylinder engines of the same piston displacement and therefore occupy less space on the frame.

Probably the first engine of this general type was the Aries, brought out in France some fifteen years ago, which was designed to be sold to owners of cars with single-cylinder engines, such as the Sizaire-Naudin, for replacement purposes. A few years ago Lancia marketed a car with a four-cylinder V engine and the Hotchkiss Company of France also has taken out patents on them.

The first question that arises in connection with such engines relates to the minimum angle at which the two sets of cylinders can be placed, because this angle will determine the irregularity in the sequence of explosion. With all the throws of the crankshaft in the same plane, equally spaced explosions can be obtained only if the cylinder axes also are in the same plane, as in the conventional four-cylinder engine; with a V-type engine the explosions naturally come at unequal intervals, unless the crank arms are set at an angle corresponding to that between the cylinders.

A variety of different types of crankshaft can be used for these engines. If the chief consideration is small overall length, a two-throw crankshaft with the two

throws opposite or at 180 deg. is best, pistons in opposing cylinders then being connected to the same crank pin. This plan was followed in the Aries design, in which one of the two connecting rods working on the same crankpin was forked, the same as in some modern eight-cylinder V engines. By using exceedingly long connecting rods (three times the length of the stroke) and cutting a large notch in the skirt of one piston so as to prevent interference between the two pistons working on the same crankpin when they approached the bottom of the stroke, the designer succeeded in reducing the angle between cylinders to 15 deg.

The one advantage of this design was minimum length, which was obtained at the expense of some irregularity in the sequence of explosions (165 deg. and 195 deg.) and of a rocking couple in the fore-and-aft plane. This engine, of course, was built for a particular purpose and had to go into the space occupied by a single-cylinder engine, which requirement no doubt influenced many of the features of design.

With Four-Throw Crankshaft

Another plan consists in staggering the cylinders and using the conventional four-cylinder crankshaft. The overall length of the engine is then determined by the minimum bearing length required and can be reduced by using a crankshaft with two main bearings. Necessarily the sequence of explosions is non-uniform, depending upon the angle between the two sets of cylinders. The fact that the cylinders are staggered helps to reduce the angle re-

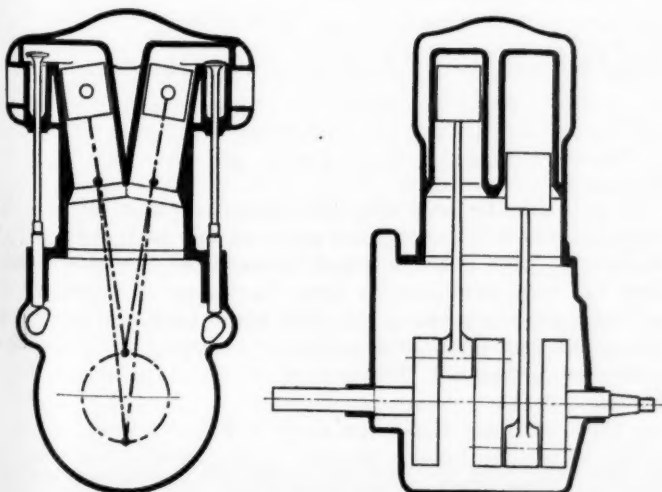


Fig. 1—Diagram of Aries four-cylinder V engine with two-throw crankshaft

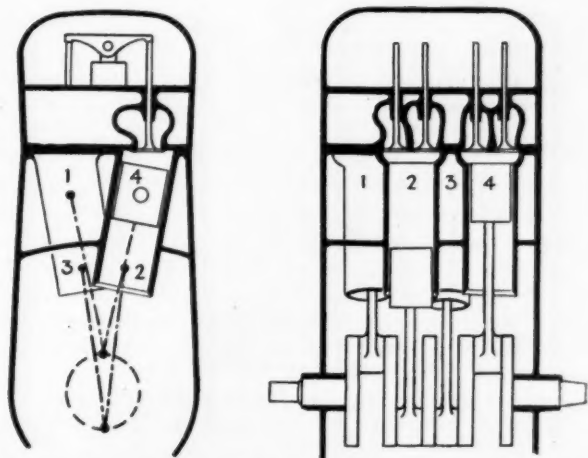


Fig. 2—Diagram of four-cylinder V engine with four throw single plane crankshaft

quired, but with connecting rods of normal length the smallest angle that can be used is about 20 deg. With this angle the explosions will come at intervals of 160 and 200 deg. respectively and the difference between the two is so small that it probably would be impossible to notice it except at very low engine speeds. The torque diagram, of course, would show somewhat greater fluctuations than if the explosions came uniformly.

Unbalanced Forces

In such an engine as here considered cylinders Nos. 1 and 3 must be in the same plane; likewise cylinders Nos. 2 and 4. No two pistons move in parallel lines and at equal instantaneous speeds, as is the case in the conventional four-cylinder engine, and the problem of inertia forces is therefore somewhat more complicated. Whatever reactions to the inertia forces there are can be resolved into free forces acting radially to the crankshaft axis, and couples in planes through the crankshaft axis.

In determining the free unbalanced forces we can disregard the fact that the cylinders are displaced relative to each other in the direction of the crankshaft axis and we will consider their axis all in the same plane, that of the paper (Fig. 2). The inertia force due to the reciprocating weights in any one cylinder may be represented by the expression

$$F = a (\cos \theta + b \cos 2 \theta)$$

where a and b are constants depending upon the weight

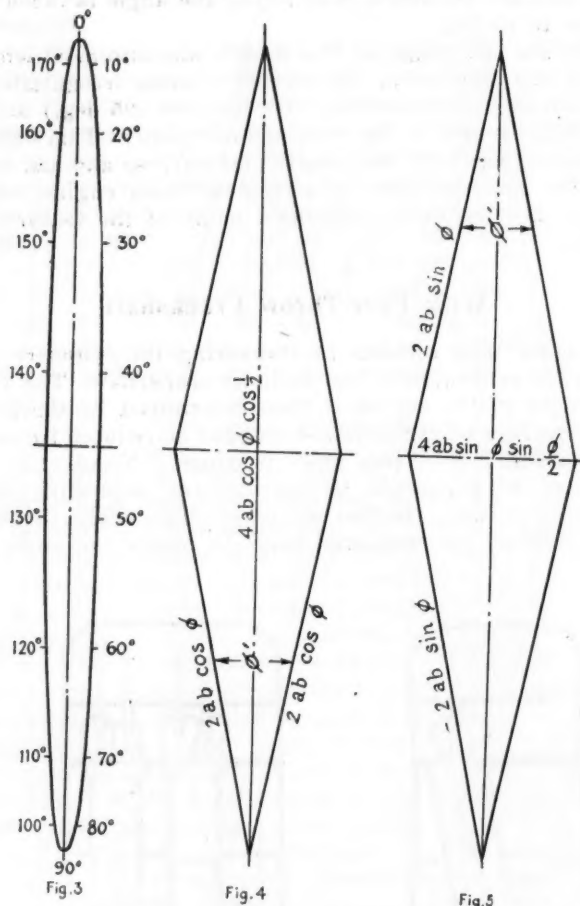


Fig. 3—Diagram of inertia forces in an engine of the type represented in Fig. 2. This force rotates at twice crankshaft speed

Fig. 4—Parallelogram of forces representing the inertia forces when the crank is in the vertical position

Fig. 5—Parallelogram of forces representing the inertia forces after the crank has moved 45 deg. from the vertical position

of the reciprocating parts, the speed of rotation, the length of stroke and the length of the connecting rod. In the above θ is the angle through which the crank has turned from the top dead center position. The term $\cos \theta$ represents the so-called primary unbalanced force and the term $b \cos 2 \theta$ the secondary unbalanced force. We will first show that the primary unbalanced forces are neutralized or eliminated in this engine.

If we denote the primary unbalanced force due to the reciprocating parts in cylinder No. 1 by

$$F_{1p} = a \cos \theta,$$

then that due to the parts in cylinder No. 3 is

$$F_{3p} = a \cos (\theta + 180^\circ)$$

But

$$\cos (\theta + 180^\circ) = -\cos \theta;$$

hence

$$F_{3p} = -\cos \theta$$

It will thus be seen that the primary unbalanced forces due to the reciprocating parts in cylinders Nos. 1 and 3 are equal and opposite, and therefore cancel each other out. (This, of course, leaves out of account the fact that the two cylinders are displaced longitudinally, the effect of which will be considered separately later.) The primary unbalanced forces due to the reciprocating parts in cylinders Nos. 2 and 4 cancel each other for the same reason. Hence we need consider only the secondary unbalanced forces.

Referred to Upright Position of Crank

It is desirable to refer the forces on all of the reciprocating parts to the same crank angle, and we will consider this angle to be zero when the crankshaft is in a vertical position and crankpins 1 and 4 are at the top. In that position the crank is already 10 deg. past the dead center line for cylinder No. 1, and whereas the expression for the secondary unbalanced force for cylinder No. 1, if referred to the dead center position for that cylinder, would be

$$F_{1s} = a b \cos 2 \theta,$$

when referred to the crank position with crankpin 1 at the top it is

$$F_{1s} = a b \cos 2 (\theta + 10^\circ)$$

or, more generally, if we make the angle between the two sets of cylinders Φ

$$\begin{aligned} F_{1s} &= a b \cos 2 \left(\theta + \frac{\Phi}{2} \right) \\ &= a b \cos (2 \theta + \Phi) \end{aligned}$$

The secondary inertia force in cylinder No. 3 would be

$$\begin{aligned} F_{3s} &= a b \cos 2 (\theta + 180^\circ + \Phi/2) \\ &= a b \cos (2 \theta + 360^\circ + \Phi) \\ &= a b \cos (2 \theta + \Phi) \end{aligned}$$

It will thus be seen that the secondary inertia force in cylinder No. 3 is exactly the same at any moment as that in No. 1. This is what would be expected, for the reason that the secondary inertia force has twice the periodicity as the crankshaft and is equal in magnitude and direction for crank positions half a revolution apart. Hence the combined secondary unbalanced force of cylinders Nos. 1 and 3 is

$$2 a b \cos (2 \theta + \Phi)$$

In the same way we find the combined secondary inertia force for cylinders Nos. 2 and 4 to be

$$2 a b \cos (2 \theta - \Phi)$$

These two forces act in the planes of their respective cylinders, their magnitudes varying between positive and negative maxima. Values can readily be calculated for any crank position, and those for the two sets of reciprocating parts combined by means of the parallelogram of forces. This gives a diagram of inertia forces like that shown in Fig. 3, in which the figures denote the crank angle measured from the upright position of the crankshaft. It will be seen that the resultant inertia force rotates and at the same time varies in magnitude. The unbalanced force is evidently a maximum when the crank is in the vertical position. For this position the angle θ is zero and the expression for the unbalanced force in each set of cylinders is $2ab \cos \Phi$. Referring to Fig. 4 it can readily be seen that the resultant of the two forces is

$$4ab \cos \Phi \cos (\Phi/2)$$

The maximum unbalanced force in a conventional four-cylinder engine is $4ab$, hence in the four-cylinder V-engine here considered the maximum unbalanced force is smaller in the proportion $\cos \Phi \cos (\Phi/2)$. If Φ , the angle of the V, is 20 deg. this figures out to

$$0.940 \times 0.985 = 0.926$$

In the conventional four-cylinder engine the vibrating forces of the class here considered are confined to the vertical plane, but in the V-engine they rotate. However, it will be seen from Fig. 3 that the horizontal component is only small. It attains its maximum value after the crank has turned through an angle $\theta = 45$ deg. so that $2\theta = 90$ deg. The expression for the forces due to cylinders 1 and 3 then becomes

$$2ab \cos (\Phi + 90^\circ) = -2ab \sin \Phi$$

and

$$2ab \cos (90^\circ - \Phi) = 2ab \sin \Phi.$$

By referring to Fig. 5 it can readily be seen that the resultant of these two forces is

$$4ab \sin \Phi \sin (\Phi/2)$$

For an angle of V of 20 deg. the horizontal component is therefore $\sin 20^\circ \sin 10^\circ = 0.342 \times 0.174 = 0.06$ or 6 per cent of the maximum unbalanced force in a conventional four-cylinder engine.

Rocking Couples

The next thing to consider is the rocking couple in the vertical longitudinal plane. Taking the two cylinders to one side of the central plane, it is obvious that the reciprocating weights will cause a rocking couple, as one piston moves up while the other moves down. The two cylinders in the other plane tend to neutralize this couple, and since the two planes are equally inclined toward the vertical, the vertical components would neutralize were it not for the fact that the motions in the right-hand cylinders lag behind those in the left-hand by an angle Φ and consequently the inertia forces in the two sets of cylinders are practically always unequal. The net rocking couple depends upon the distance between the axes of the cylinders on the same side of the vertical plane and upon the angle between the two pairs of cylinders, and, as both of these factors are held small, it is of no great importance.

Comparing this type of V engine with the conventional four-cylinder vertical type, it will be seen that the maximum value of the vertical component of the vibrating force in the former is slightly less (about 7.5 per cent) than the corresponding force in the latter, but in addition to this vertical component there is a small horizontal component whose maximum value is of the order of 6 per cent of the maximum value of the vibrating force in the

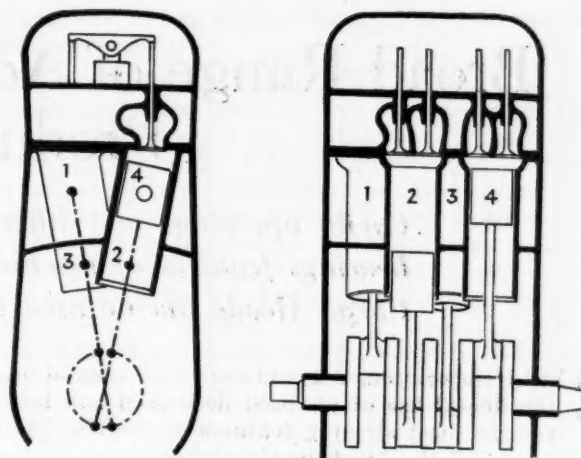


Fig. 6—Diagram of four-cylinder V engine with cranks in two planes

conventional four-cylinder engine. Besides, there is a small rocking couple in the longitudinal vertical plane. It would, therefore, seem that the four-cylinder V engine with a small angle of V should create no more perceptible vibration than the conventional four-cylinder engine.

In the third design the cylinders are arranged as in the one just described but the crankshaft is different, all of the cranks being in the dead center position simultaneously. This has the advantage that the explosions come at equal intervals and that the torque curve, consequently, is as good as that of a conventional four-cylinder engine. The crankshaft, of course, is somewhat more difficult to manufacture than one having all throws in the same plane.

Primary Unbalanced Forces Eliminated

In order to determine the unbalanced forces, let us denote the angular position of the crank in the diagram by zero deg. Then the inertia forces due to the reciprocating parts in cylinders Nos. 1 and 4 may each be represented by the expression

$$F = a (\cos \theta + b \cos 2\theta)$$

and those due to cylinders Nos. 2 and 4 by

$$F = a [\cos (\theta + 180^\circ) + b \cos 2(\theta + 180^\circ)] \\ = a (-\cos \theta + b \cos 2\theta).$$

We see from the above that, since $\cos \theta$ is positive in one case and negative in the other, the primary unbalanced forces cancel out. The secondary unbalanced forces remain, however. Since these forces act in the direction of the respective cylinder axes and those in cylinders 1 and 4 and in 2 and 3 respectively, are at all times equal, it is obvious that the resultant free unbalanced force will at all times be in a vertical plane, and its value will bear to that of the conventional four-cylinder engine the ratio of $\cos \Phi/2$ to unity, where Φ is the angle between cylinders. Therefore, the vibrating force in the vertical plane is less than in the conventional four-cylinder engine and there is no transverse vibrating force, the same as in the latter.

There is also no rocking couple, for the reason that the couple introduced by cylinders Nos. 1 and 3 is exactly balanced by the contrary couple produced by cylinders Nos. 2 and 4. Therefore in this case the shortening of the engine does not have to be paid for by a sacrifice in balance.

As regards the centrifugal force on the rotating parts, it can readily be seen that the resultant of these forces on cranks 1 and 4 is in line with, equal and opposite to the corresponding forces on cranks 2 and 3, hence these forces also balance each other.

Broad Range of Adaptation Given by New Production Unit

Cyclic operation and liberal use of enclosed flood-oiled ball bearings features of machine produced by Meldrum-Gabrielson Corp. Heads can be used independently on similar operations.

CYCLIC operation, a broad range of adaptation and the liberal use of enclosed flood-oiled ball bearings are the most striking features of the No. 2-G Production Unit of the Meldrum-Gabrielson Corp., Syracuse, N. Y. Primarily a continuous production unit, the two heads of this machine operated independently on similar operations or by re-arrangement of the heads, will handle successive operations of entirely different character. Plain heavy-duty drilling or boring, multiple-spindle drilling, plain or special multiple milling, heavy box-tool forming and other operations of a similar nature can be accomplished by the installation of suitable heads. The standard machine is equipped with a standard taper shank socket which will drive a 2 in. dia. drill through nickel steel on a high-production basis.

As illustrated by Fig. 1, the machine consists of two box section columns mounted on a common base. The center lines of the columns are 33 in. apart and the drive pulleys for each unit are located in the space between the columns. Single constant speed pulleys running at 450 r.p.m. are mounted freely with intermediate lever-operated

shoe clutches on the drive shafts which, like all of the shafts in the spindle drive train, are carried on ball bearings.

As the mechanism of both units is alike, further description will deal with the details of a single unit. Following the spindle driving train through to the tool, the drive shaft is splined and carries a sliding gear which is shifted by a lever at the side of the column. Two spindle speeds are thus obtained at will. A two-row annular bearing is located adjacent to the drive pulley and the opposite end of the shaft carries a single row bearing.

In turn, the sliding gear meshes with either of two gears which are fixed on a shaft which is directly above the drive shaft. This shaft is carried by two single row ball bearings and has a change gear at its outer end. This gear, in turn, meshes with the second change gear on the third shaft of the train. Both of these change gears are enclosed in an extension box which is equipped with a removable cover. Inversion of the gears produces a second combination of two spindle speeds, or gears of other ratios may be fitted at this point to produce any

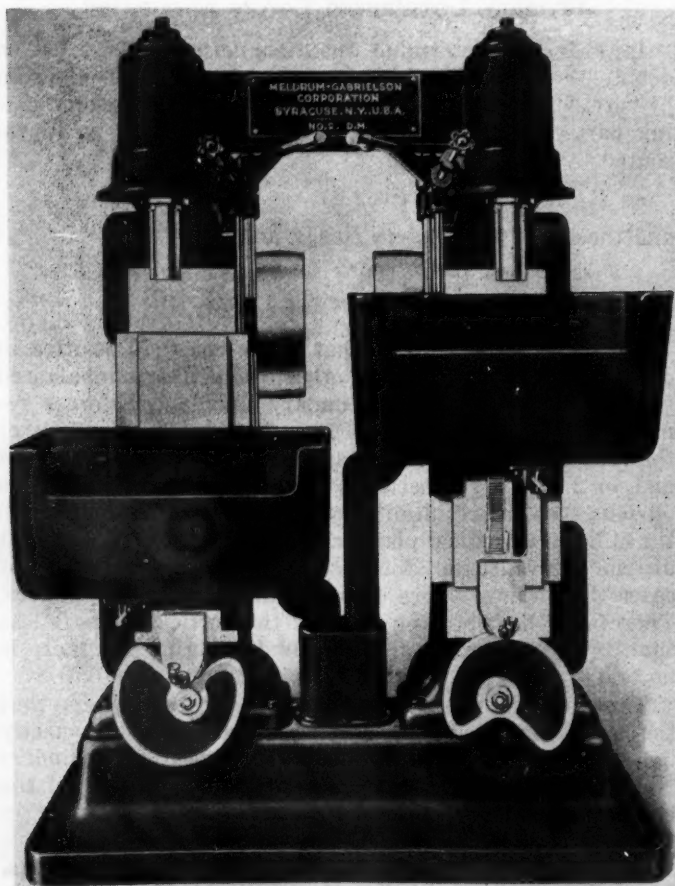


Fig. 1—Front view of Production Unit showing feed cams at bottom and high splash pans on work table. Spindle is fitted with standard taper shank extension

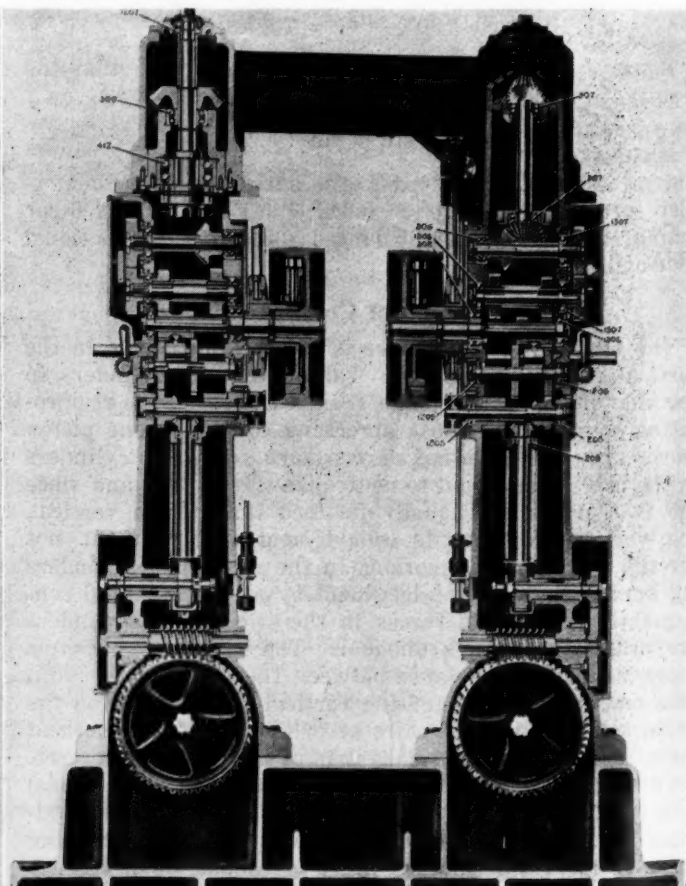


Fig. 2—Longitudinal section. Note extensive use of ball bearings and spline shafts

desired reduction. Within this box is also located a fixed shaft which may be equipped with an idler gear to run between the two gears for the purpose of reversing the rotation of the spindle.

On the third shaft is also mounted a bevel pinion which is backed up by another two-row ball bearing, there being a single row bearing at the change gear end. This bevel pinion engages with a larger gear which is mounted on the lower end of a shaft which extends diagonally forward and upward driving the spindle through another pair of bevel gears at its upper end. Due to the greater stresses and the thrust of the bevel gears, this shaft is supported by two two-row bearings. The tool spindle is carried in three ball bearings; a large two-row at the lower end which carries the cutting reactions; a second two-row bearing just below the bevel drive gear and a single row at the top of the column and spindle.

Tool Holding Arrangement

At its lower end, the spindle is formed into a flange and a pilot for the accommodation of different types of tool and head drives. Ordinarily, the spindle is equipped with an extension as shown in Fig. 1, which is the equivalent of a standard taper shank socket. This detail as well as the design of the entire drive is capable of driving a drill of 2 in. dia. through nickel steel under the conditions that hold good in the automotive production shop.

When other set-ups are desired for multiple drilling, multiple milling, etc., the form of the extension can be varied to suit the individual case.

One of the outstanding features of this machine is the cam actuation or feed of the work table. The tool spindle has no vertical motion and feeding and return to the loading position are accomplished entirely by the vertical movement of the work table. The table proper is carried on a saddle and may be adjusted up and down on a slide for suitable location by a hand wheel at the front. The saddle in turn moves vertically on ways which are scraped in the front of the column and derives its motion from a roller which contacts with the feed cam at the bottom of the column. This cam is shaped to meet the feed and clearance requirements of the individual piece.

In operation, a depression in the contact surface allows the table to drop to the lowest position for loading and unloading. When the part to be machined is properly in place the operator pushes on a button which is adjacent to the clutch lever near the top of the column. The table then elevates rapidly, approaching the working position when the cam surface is modified to produce the correct feed for the work at hand. In some cases the cam surface produces a constant elevation for drilling, boring or box-tool forming and then a radial section permits finish spot-facing just before the point of release.

Feeding Mechanism

The feeding mechanism is driven by the pulley shaft although shifting gears does not change the ratio between the former shaft and the next below. The second shaft in the feed train is also mounted on ball bearings and drives a combined spur and bevel gear on the third or next lower shaft through a spur gear at the outer end. From this bevel gear, another bevel gear and vertical shaft drive the first worm and worm gear in the feed mechanism. The worm mounting at this point is swiveled and automatically releases as the cam roller reaches the lowest point in the depression in the cam. This arrangement is also controlled by another combination of two bevel gears and shafts which connect with the control button which has been described as being near the top of the column. This device is utilized to engage the feed mechanism after the new piece to be machined is put in

place and also serves as an emergency stop at any phase of the cam action.

Change Gears

Change gears are again located at the outer ends of the worm shafts which are installed with their centers crosswise. These gears may be interchanged to vary the drive ratio or may be supplanted with gears of any other desired ratio. The lower worm drives a large bronze worm gear which is mounted directly on the cam shaft. This worm is backed up by a ball thrust bearing which carries the thrust during the elevation and feeding portion of the cycle. As desired for other types of work, the cam operation feature may be made inoperative. An alternative unit may then be installed to feed the table laterally for plain milling and similar operations.

A compartment in the base which communicates with the column around the lower worm gear serves as an oil sump. A belt driven gear pump delivers oil from this source to the top of the interior of the column from whence it floods all of the gears and bearings. The remainder of the base forms a coolant pan and another belt driven gear pump delivers the liquid to the tools. For some types of operations the work tables are equipped with splash guards as shown in Fig. 1 and several variations are available. The work tables drain to the coolant pan as shown. No provision is made for the correlation of the cycles of the two cams as the operator by his speed of loading and unloading determines the relationship of his operations. In any case, when the class of work for which the machine is adapted is considered the cutting time of one unit is more than sufficient for loading at the other.

Factory Capacity Likely to Exceed Sales in 1924

(Continued from page 323)

panding as it has in the past two years, he can prove to his own satisfaction that his company can sell all the cars it can make. Not all of them can be right. If the market has been overestimated, somebody will suffer. It may be the manufacturer who has built up stocks or inventories which he can't move; it may be the parts maker, when he finds commitments cancelled or shipments held up indefinitely, or it may be the dealer if he has taken more goods than he can reasonably expect to sell. In the case of most dealers this means failure. It is estimated that the annual dealer mortality is about 25 per cent, and the cost of replacing a dealer ranges from \$300 to \$500, which must be added to the factory cost of merchandising automobiles.

If tentative production schedules have been placed at too high a level, as we believe they have in a good many cases, success will be individual rather than general. As output shrinks, profits per unit become smaller, unless prices are readjusted. Big companies can maintain their net earnings at present prices only by keeping up production and sales. The necessities of competition will make price advances difficult, if not impossible.

Fortunately, virtually all the leading companies are in good position to get through the year, even if it proves less prosperous than expected, but such an outcome probably would result in a good many changes in the automotive map. These might come in the way of combinations, or eliminations for the weaker concerns.

The automotive industry is assured of a splendid business for 1924, and it would be unfortunate, indeed, if its profits were endangered by an overestimate of the probable demand for its products.

Two-Cylinder Sport Plane Engine Is Built to Morehouse Design

Light weight per horsepower with rugged conventional construction said to be combined in new 3 x 3 in. air-cooled unit which weighs under 50 lb. Has roller bearings on big ends of connecting rods. May be used in motor-glider flights at Pulitzer meet.

By Glen D. Angle

In charge of engine design, Engineering Division, Air Service, U. S. A.

THAT a designer can obtain light weight per horsepower with conventional practice in a small rugged design has certainly been proved in the new engine recently placed on the market by the Steel Products Engineering Co. of Springfield, Ohio, built from the designs of Harold E. Morehouse.

The engine is an air-cooled four-cycle type having two horizontally opposed cylinders. The bore and stroke are 3 in., hence the total piston displacement is 42.4 cu. in. The power characteristics of this engine are shown on the accompanying chart, which represents the results obtained during initial tests.

Power developed is 50 per cent higher than originally guaranteed. The output of this engine compares favorably with that of some of the best known aircraft engines. This is especially interesting in view of the fact that the air blast provided for cooling during the tests at no time exceeded 15 m.p.h. and further that, in spite of the small volume of air used, the engine showed no visible signs of overheating.

It will be seen from the chart that the engine developed 15 b.hp. at 2400 r.p.m., the maximum safe speed of the

dynamometer used, and that the corresponding brake mean effective pressure was 116.5 lb. per sq. in. At this speed, a remarkable low fuel consumption of 0.52 lb. per b.hp.-hr. was obtained. Both power and b.m.e.p. curves show a steady rise. The dry weight of the engine, as shown in the accompanying cuts, complete with carbureter and magneto, is slightly under 50 lb.; hence the weight per hp. is around 2.5 lb.

The crankcase is provided with a pilot and an eight-bolt flange for mounting a housing containing reduction gears; consequently, when used in light airplanes, any desired propeller speed can be obtained. The weight of a suitable propeller reduction gear should not exceed 15 lb. complete. Overall dimensions of the engine are: length 12 $\frac{3}{4}$, width 24 $\frac{3}{4}$ and height 19 inches.

Suited for Motor-Glider Service

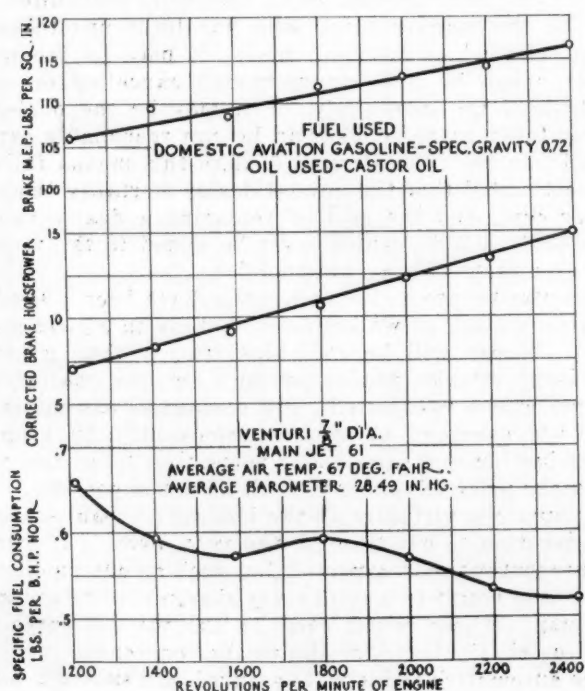
This engine is believed to be well suited for light sport airplanes or motor-gliders, and should, therefore, be especially interesting to light plane enthusiasts since it has been decided to stage light plane events in connection with the Pulitzer races that are to be held in Dayton next fall. Gliding and light plane contests in Europe have created wide interest and a few constructors already have developed special engines for this class of work.

A feature of the engine is its simplicity and freedom from delicate parts. That attention has been paid to the ease of replacing parts, should it be found necessary, is evident by the fact that most assemblies can be removed from the engine without disturbing any of the others. The crankshaft assembly, for instance, can be removed without lifting the engine from its supports or disconnecting the carbureter, gas lines or controls.

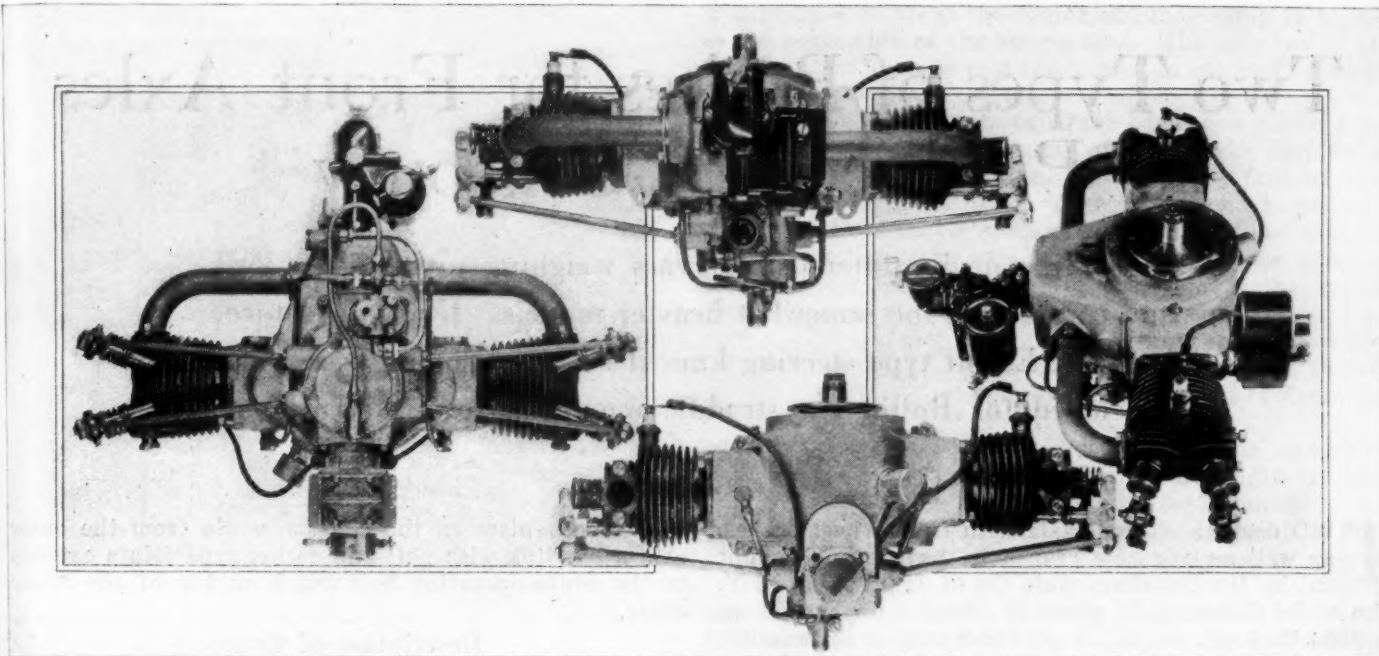
The crankshaft has two throws at 180 deg. and is counterbalanced. The main journals are carried in ball bearings, and on the crank-pins narrow rollers are used with the result that the total offset between cylinder axes is only $\frac{5}{8}$ in. Connecting rods are drop-forged steel and are fitted with removable hardened liners serving as outer races for the crank-pin rollers. A bronze piston pin bushing is used in the upper end of the rod.

The hardened and ground piston pin is 0.70 in. in diameter and floats in both rod and piston bearings. Buttons of either bronze or aluminum prevent the pin from scoring the cylinder. Flat ribbed head aluminum pistons 2 $\frac{7}{16}$ in. long are used. The normal compression ratio is 5 to 1. There are three $\frac{1}{8}$ -in. rings per piston, all being located above the pin boss.

Cylinders with integral cooling flanges are cast iron. Each has two interchangeable talip shaped valves, with axes inclined at 20 deg. to the axis of the cylinder. Valves



Performance curves of two-cylinder 3 x 3 in. Morehouse engine



Four views of two-cylinder air-cooled engine built by Steel Products Engineering Co. for use in sport and light-weight planes or motor gliders

seat directly in the spherical head of the combustion chamber. The valves should cool well because the stem diameter is $\frac{5}{16}$ in. and the 45 deg. seats are $\frac{1}{8}$ in wide. The valve port measures $\frac{13}{16}$ in. in the clear, and the maximum valve lift is $\frac{9}{32}$ in. Each valve is held upon its seat by a single coil spring showing a pressure of 28 lb. at valve closed position. The cast-iron valve guides can be removed readily for replacement when necessary.

Valve Mechanism Described

Valves are operated by push rods and rockers. The push rods are extremely light, being made from duralumin tubing with small ball fittings pressed into the ends. Rockers are provided at the push rod end with means for adjusting the tappet clearance, and at the valve end a roller tappet is used. Rockers are supported in brackets, each of which is held to the cylinder by a single stud.

The aluminum crankcase is provided with only one large opening. This is at the back, and it is through this opening that the crankshaft assembly is slipped into place. This opening is covered by the housing which carries the camshaft. The latter, supported in bronze bearings, drives the magneto at its upper end, and is provided with jaws at the lower end for hand starting the engine with a crank. Cams are integral with the camshaft and have a $\frac{13}{16}$ -in. base circle and $\frac{3}{8}$ -in. face width. The cams are alike and can be produced from one master cam. Timing of the valves is as follows: inlet opens on top center and closes 48 deg. late. Exhaust opens 48 deg. early. Exhaust closes on top center.

The oil sump, which is cast integral with the crankcase, is so made that by slight alterations it will function properly with the crankshaft axis either in a horizontal or vertical position. The cylinder is located in the crankcase by two pilots, one near the inner end and the other about one-half way up the barrel, thus forming a compartment into which oil is fed from the gear oil pump. A small hole in the upper side of the cylinder barrel affords a passage for leading oil to the pistons, and the oil spray from the latter lubricates the crankshaft ball and roller bearings. Surplus oil that is fed into these compartments serves to cool the lower part of the cylinder barrel, and is returned to the sump through a separate passage.

Attached directly to the crankcase is a 1 in. special Stromberg carburetor. That shown in the accompanying cuts is a side outlet type for use only with crankshaft axis in a vertical position. In the oil sump are cast Y-shaped gas passages which serve not only to cool the oil, but to warm the mixture going to the cylinders. From these passages the mixture is led to the cylinders through separate flanged pipes.

Ignition is furnished by the vertically mounted American Bosch magneto and a single spark plug in each of the cylinders. The shaft of the gear oil pump extends through the pump casing and is provided with a drive for a tachometer at the end.

A small breather for the crank compartment is located on the upper wall of the crankcase. Underneath the crankcase, two flat surfaces are machined to receive mounting flanges. The engine is held to its mounting by four $\frac{3}{8}$ -in. bolts.

There are very few joints from which oil can leak. Apparently the design is the result of a careful study along the lines of producing a simple, light and compact engine consistent with the durability expected from the average user.

Steel Made Direct from Ore

A FRENCH patent was issued recently to L. P. Basset of Paris on his method for making steel directly from iron ore. The process consists in subjecting the ore, mixed with the amount of carbon necessary for its reduction and with appropriate fluxes, to the action of a flame obtained by the combustion of powdered coal in the quantity of heated air necessary to insure combustion to carbon monoxide and a small amount of carbon dioxide, in such a way that in spite of the slight loss of metal due to the oxidizing action of the carbon dioxide (95 instead of 100 per cent reduction) there results an economy due to the diminution in the quantity of powdered coal involved and the easier crushing of the latter.

On the other hand, the production of carbonic acid, which is accompanied by the liberation of 14,550 B.t.u. per pound, as compared with 4450 per pound for carbon monoxide, represents an important saving on fuel.

Two Types of Brakes for Front Axles Produced by Salisbury

Expanding device intended for cars weighing up to 2400 lbs. and contracting for somewhat heavier models. Unusual feature is use of Elliott type steering knuckles. Semi-floating rear axle developed for Rollin has straddle mounting for bevel pinion.

TWO designs of front axle with front wheel brakes, as well as one new rear axle, have been brought out by the Salisbury Axle Co. of Jamestown, N. Y. The Model C front axle, which is intended for cars of up to 2800 lb. total weight, is provided with a contracting type of brake, while the Model D, which is suitable for cars of a total weight up to 2400 lb., has an expanding brake.

The Model C, between spring pads, has a section $2\frac{1}{8}$ in. high by $1\frac{3}{8}$ in. wide, the thickness of the web of the I section being $\frac{3}{16}$ in. At the inner side of the spring pads the web begins to thicken and outside the pads the thickness is 1 in. As a result of this change in the web thickness the torsional stiffness of the axle ends is greatly increased, while the characteristic appearance of the I section is retained. The upper flange of the axle forging merges gradually into the spring pad from both sides.

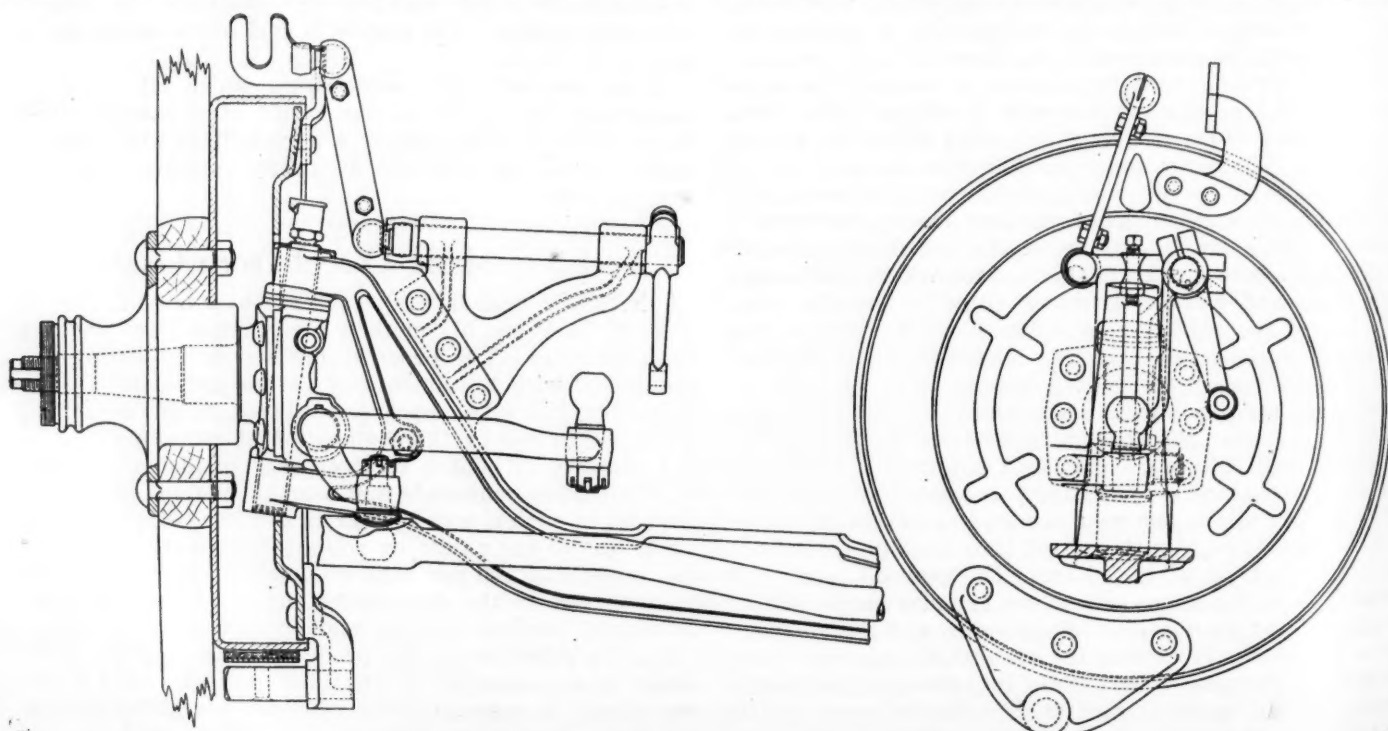
A rather unusual feature for a front axle with front wheel brakes is the use of Elliott type steering knuckles. A flange is forged on the back side of the forked steering head, to which is bolted a bracket providing two bearings for a short shaft carrying lever arms at both ends. From the inner arm, connection is made to the

brake mechanism on the chassis, while from the outer arm a bar link with ball and socket type joints extends to the brake-operating bell crank on top of the brake drum.

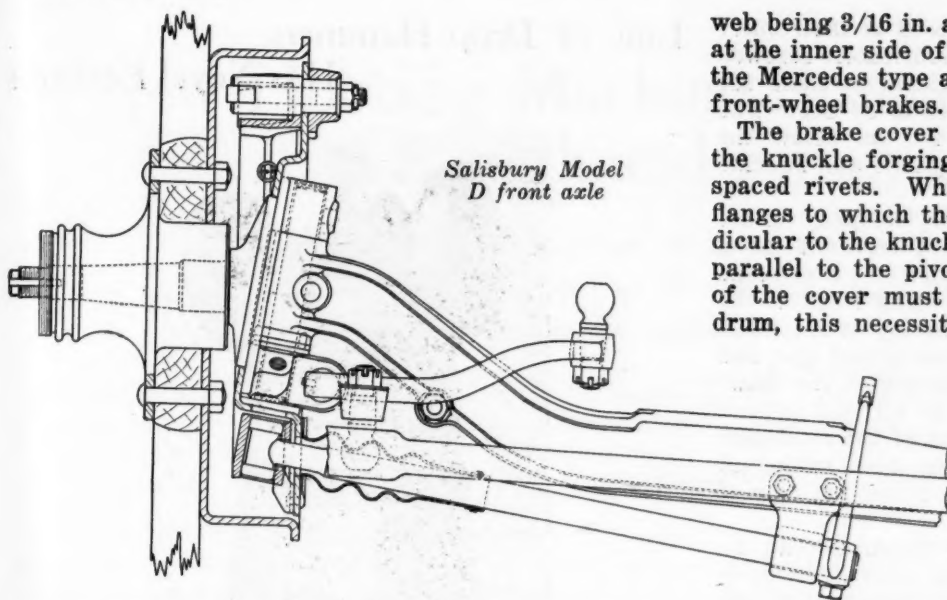
Description of Brake

A brake drum with an outside diameter of $14\frac{3}{8}$ in. is used, the width of the band being 2 in. The vertical part of the steering knuckle is forged with flanges on opposite sides, to which the brake cover or brake support is secured by means of six rivets. The cover is dish-shaped and has a number of ribs stamped in it to add to its stiffness. At the bottom this cover plate carries a bracket supporting the brake band at the middle of its length and sustaining the brake reaction, and at the top there is another bracket whose slotted end extends above the brake drum and serves as a guide for the brake band contracting bolt and as a support for a retracting spring.

The contracting mechanism is of the type usually employed with rear wheel band brakes, comprising a bell crank with one arm pinned to one end of the band, from the fulcrum of which a forked link extends to the other end of the band. The link is threaded over part of its length and carries a nut and lock nut, by means of which



Salisbury Model C front axle with front wheel contracting brakes



Salisbury Model
D front axle

web being $\frac{3}{16}$ in. at the center and increasing to $\frac{3}{4}$ in. at the inner side of the spring seat. The axle end is of the Mercedes type as commonly used in connection with front-wheel brakes.

The brake cover plate or brake carrier is secured to the knuckle forging by means of six nearly uniformly spaced rivets. While in the Model C the face of the flanges to which the brake cover is fastened is perpendicular to the knuckle spindle axis, in the Model D it is parallel to the pivot axis, and since the outer portion of the cover must conform to the edge of the brake drum, this necessitates an irregular depression of the center. In fact, directly below the axle the cover comes close to the bolts holding the brake drum in place.

The brake drum has an internal diameter of $11 \frac{15}{16}$ in. and accommodates brake shoes 2 in. wide. It is provided with a substantial external flange to give it additional stiffness. The shoes

are supported on top of the drum by means of a bracket riveted to the brake carrier or cover plate, and are expanded or pressed against the interior of the drum by a floating cam at the bottom. This cam is of the type with longitudinally curved faces, its transverse axis coinciding with the axis of the knuckle pin, so that the application of the brakes is not affected by steering motions.

Means of Adjustment

Adjustment for wear of the brake lining is made by means of a plug carrying integral wedges, by means of which blocks carried in slots in the ends of the brake shoes can be forced apart. The brake shoes are made of malleable cast iron.

The cam for applying the brake is formed integral with its shaft, which latter is mounted underneath the axle center in such a way as to be perpendicular to the knuckle pivot axis. It is supported by a single bracket at its inner end and carries the operating lever on the inner side of this bracket. This lever curves around the axle section.

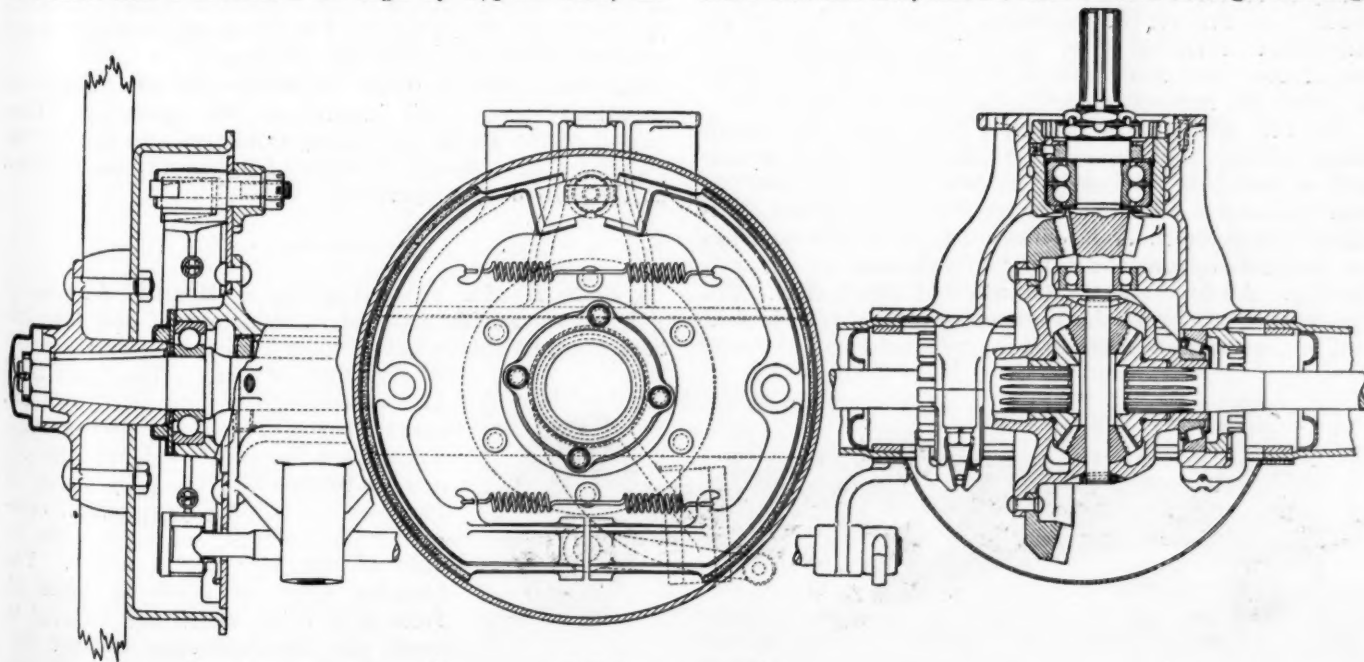
The knuckle pin is held in the axle end by means of a draw bolt and nut, and its ends extend through bushings

the clearances between the two ends of the band and the drum can be equalized.

It will be seen that the ball joint at the end of the bell crank lies in the axis of the steering knuckle pivot, hence the application of the brakes is not affected by any deflection of the steering wheels around their pivots. The knuckle arms are secured into the knuckles by means of tapered joints. The knuckle spindles make an angle of $2\frac{1}{2}$ deg. with the horizontal, while the knuckle pivots make an angle of $5\frac{1}{2}$ deg. with the vertical, which brings the intersection of the knuckle axis with the ground very close to the center point of the contact area between tire and ground.

A maximum wheel deflection of 36 deg. is provided for, this being limited by projections forged on the steering arms and adjustable set screws in the axle. The ball studs are separate from the steering arms. The tie rods, which are of the one-piece type and located back of the axle, are provided with covers over the openings of the ball joints, so as to exclude dust and moisture.

The smaller Model D axle, which is used on the Rollin car, differs from the Model C in almost every respect. Its center has a section 2 in. high by $1\frac{1}{4}$ in. wide, the



Salisbury rear axle

in the steering knuckle which are closed at their outer ends and receive their lubricant from lubricators screwed into the hubs of the knuckle. Provision is made for limiting the deflection of the knuckles to 36 deg. The top of the spring pads is dropped $2\frac{3}{4}$ in. below the point of intersection of the knuckle spindle and knuckle pivot axes.

A rear axle developed by the Salisbury company for use on the Rollin car is of the semi-floating type and has a pressed steel housing. The bevel pinion has a straddle mounting, a double row ball bearing being fitted at the big end and an annular single row bearing at the small end. The differential gear is of the two-pinion type and mounted in taper roller bearings. The double row bearing is carried in a sleeve which can be screwed into or out of the gear carrier for adjustment of the mesh and locked when necessary adjustment has been made. A large dome-shaped pressed-steel cover closes the rear of the differential housing.

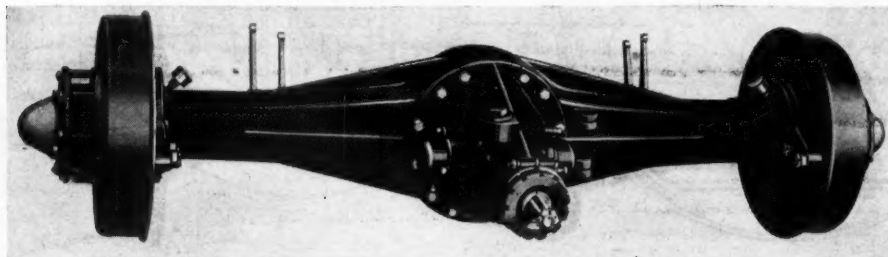
The two bearings carrying the differential can be moved axially by means of nuts on their outer sides, these nuts having castellated extensions, by means of which they can be turned and locked. Pressed-steel oil guards are secured into the axle housings just outside the differential housing, to prevent the lubricant in the central housing from working out toward the ends of the axle and dripping on the floor or getting on to the brake surfaces. The design of the brakes is very similar to that of the front-wheel contracting brakes.

Double Reduction Bus Axle Gives Low Center of Gravity

A DOUBLE reduction axle specially designed for bus service has been brought out by the Wisconsin Parts Co. of Oshkosh. In double reduction axles the intermediate shaft carrying the bevel gear and the spur pinion is usually located either directly above or forward and above the axle center, but in this axle, in order to permit of a low frame and of thus securing a low center of gravity, the intermediate shaft is placed directly in front of the axle.

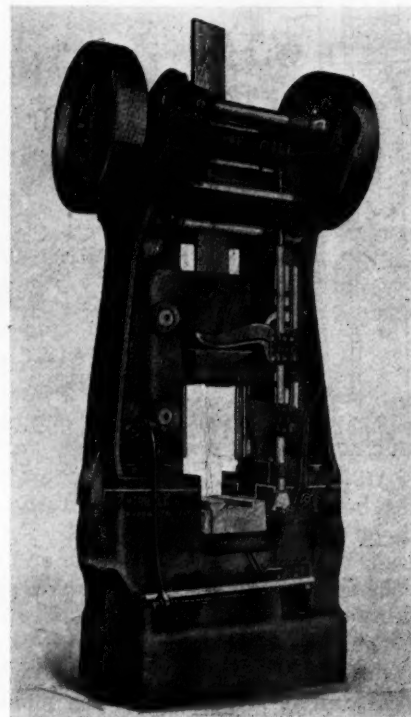
The axle is made in four models varying in carrying capacity and width of tread. As far as the carrying capacity is concerned, one of the models is for 15-passenger buses, two are for 25-passenger buses and one is for large buses carrying 30 or more. The axles for 25-passenger buses are made with a tread of either $57\frac{1}{2}$ or 66 in., while the heaviest model is furnished in only 71 in.

The first reduction is by spiral bevel gears, the pinion being made integral with its shaft, which latter is carried on two ball bearings. The bevel ring gear and the spur pinion are mounted side by side on a splined shaft carried on taper roller bearings. All gears and bearings are lubricated from the supply of lubricant in the axle housing. All of the gears are made of nickel steel. The design of the differential, axle housing, axle shafts, brakes, etc., is the same as in other Wisconsin axles.



Wisconsin bus axle

Line of Drop Hammers Has Novel Features



Merrill drop hammer

A NEW line of hammers for the forging shop, for which several improved features are claimed, has been brought out by Merrill Brothers, Maspeth, New York City. The hammers are of the board type and are made in sizes ranging from 600 to 5000 lb. of falling weight. Among the features of these hammers, which are claimed to overcome some of the difficulties heretofore experienced in the forging shop, may be mentioned the following:

An adjustment is provided to compensate for uneven wear of the roll bearings. The hammers have rigid and non-adjustable upright frames, inserted adjustable and reversible ram guides, a treadle safety lock and a straight friction bar. The front and back die adjustment is immovable when locked by the die key.

The hammers are fully automatic and are said to be constantly under the control of the operator. They permit of the use of dies of any thickness and can deliver either a single blow or a series of light and heavy blows, at the will of the operator.

A BENCH vise possessing the distinctive feature of having a slide made of steel instead of cast iron has been brought out by the Simplex Tool Co. under the name of the Simplex Gray. The body is of cast crucible iron and the jaws are made of steel, hardened and ground. The square thread screw is machine cut and is retained in place by a cap in front of the sliding jaw, which eliminates the necessity of coring the inside of the vise for a collar. The Simplex Gray is made in sizes of from 3 to 7 in., which are believed to meet the requirements of the industry.

New Hobbing Machine Specially Designed to Rough and Finish Gears

Can be used for production of both spur and helical types in quantities. Also adapted to diversified range of work. Power traverse permits cutter to move rapidly in either direction.

A GEAR hobbing machine specially suited for roughing and finishing spur and helical gears in quantity and which is also adaptable to a diversified range of work has been brought out by Gould & Eberhardt, Newark, N. J., and will be known as the 16-H S.

The arrangement of the power transmission from the prime mover to the work spindle and the hob spindle, respectively, is such as to substantially equalize the backlash in these drives. A diagrammatic view of the drive is shown in Fig. 1. It will be noted that each spindle is driven from the prime mover through two pairs of gears, one pair in each drive being a worm and wheel. Most of the gears used in this machine are of heat-treated alloy steel and are secured to their shafts by integral splines. The index and cutter spindle worms are hardened and ground. The cutter spindle worm wheel is made of bronze and the index worm wheel of chilled cast iron.

Fig. 2 is a velocity diagram showing the relative uniformity of the angular velocity ratio between the cutter and work spindles, which is claimed to result from the arrangement of the power transmission described. It is this velocity ratio which determines the accuracy of the gears cut.

Controls Accessibly Located

Referring to the illustration of the machine itself, it will be noticed that all of the controls have been placed within easy reach of the operator. There are three operating levers. One controls the main clutch for starting and stopping; another controls the power traverse for the cutter carriage and the third the feeding motion of the cutter. One handwheel moves the cutter carriage for small adjustments and another positions the stanchion for proper depth of cut or for different blank diameters.

By means of the power traverse the cutter can be moved in either direction at a speed of 100 in. per min.,

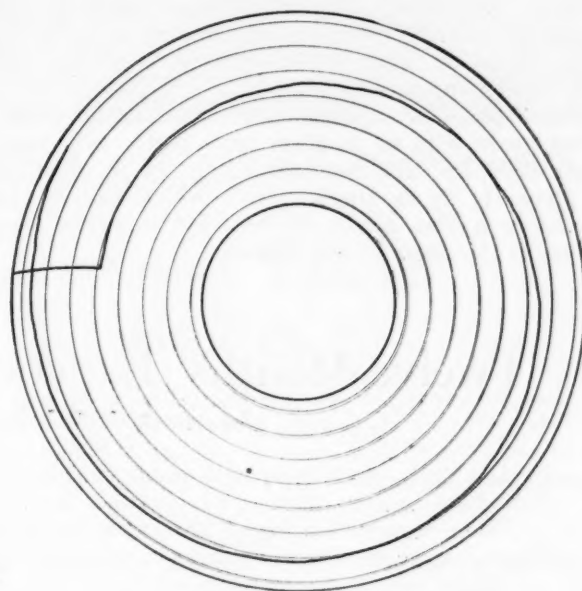


Fig. 2—Diagram of angular velocity ratio

whether the work and cutter spindles are rotating or not. The rapid traverse operating lever is interconnected with the feed lever so that the feeding movement cannot be started until after the power traverse movement has first been disconnected and vice versa. Operation of the power traverse lever in either direction will automatically disconnect the feed if necessary and there is an additional safeguard against accidental operation of the rapid power traverse in the downward direction, which prevents injury to the cutter and blank.

Automatic Features

Movement of the power traverse to the cutter is limited in either direction by a fixed stop, while an adjustable stop limits the upward movement of the cutter carriage. This permits of stopping the cutter in a position most convenient for loading and unloading of the blanks.

By means of a bellcrank and cam device the power downward traverse can be disconnected at any predetermined point, to permit of rapidly positioning the hob for cutting. This same device prevents engagement of the power downward traverse during the cutting operation.

Automatic flood lubrication is provided to the work spindle index worm and to most of the revolving parts. The lubricant is pumped to an elevated reservoir from which each bearing and gear is supplied, and the overflow returns to a settling chamber to be used over again. The stanchion is provided with a multiple gravity oiler which supplies the moving parts in that unit, and sight-feed oil cups are used for the cutter spindle and carriage units.

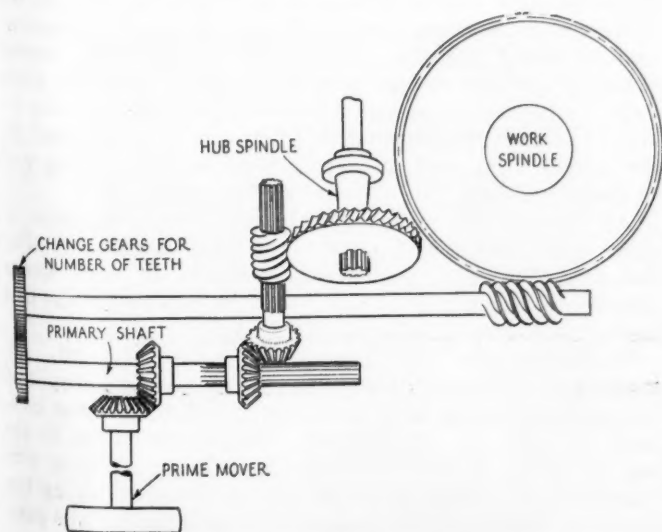


Fig. 1—Drive to work spindle and cutter spindle

A rigid box section outer support for the end of work arbors is secured directly to the base. The arbor supporting arm, slidably arranged on the outer support, can be easily moved upwardly and swung out of the way to permit the removal of the blanks.

Cutter Spindle Adjustments

The machine can be furnished with a fixed angularly positioned cutter spindle for either spur or helical gears of a given pitch, or a cutter spindle can be provided with a slight angular adjustment for spur and helical gears of different pitches. Steel gears up to 3 diametral pitch, up to 18 in. diameter and up to 14 in. face can be cut. Ten cutting speeds are provided, ranging from 50 to 225 r.p.m. Feeds of from 0.01 to 0.25 per revolution of the blank can be furnished.

Special pairs of change gears can be provided for cutting gears with up to 50 or more teeth. The machine weighs 6500 lbs. and requires 53 by 84 in. floor space. The drive is by a single pulley which can be belted directly to a line shaft, or an electric motor can be mounted on the rear of the machine.

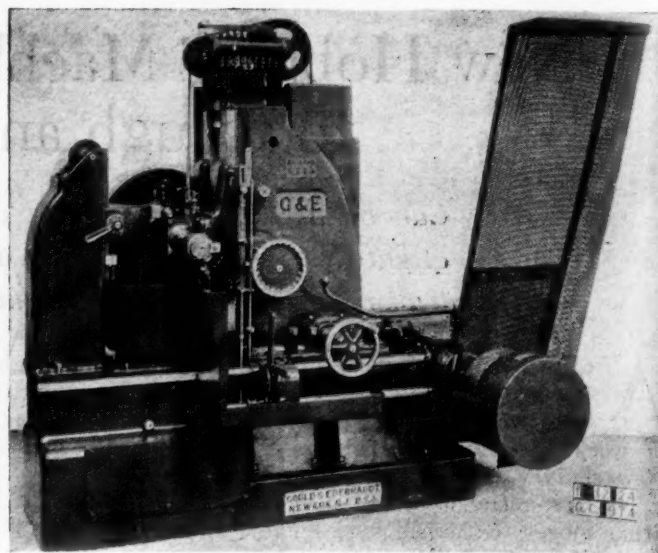


Fig. 3—Gould & Eberhardt 16-HS gear hobbing machine

Twelve Months' Experience With Four-Wheel Brakes

(An owner-driver's experiences as recounted in *The Autocar*)

ONE year's daily experience with a car equipped with front-wheel brakes, during which time the owner-driver has been responsible for all the attention given to the machine, suggests a few remarks which may be of value to others not quite certain whether this more modern, and admittedly intriguing, system of braking is free from inconveniences.

The car, a 12-hp. Talbot-Darracq, fitted with the Perrot type of brakes having a semi-servo in the front-wheel drums, has never been off the road since the day it came out of the factory, and, like most owner-driven cars, has had to be content with alternating periods of neglect and care, as leisure was available.

There was a period of a week or two when the temptation to step on the pedal and pull up all-standing could not be resisted. This *maladie* soon passed, however, and the increased rapidity of deceleration was almost lost sight of, but the feeling that there was wonderful braking power in reserve, and that, in case of emergency, the car could be arrested in less than half the distance required with rear-wheel brakes, remained as an assuring and comforting thought.

Much more important than the rapidity with which stops could be made was the feeling of safety by reason of the absence of skidding. While it would be an exaggeration to state that a car with front-wheel brakes cannot skid, it is true that 95 per cent of skids are eliminated by this system of braking simultaneously on all four wheels. The only condition under which the Talbot-Darracq has been known to skid has been on very heavily cambered wood pavement in a greasy condition, when the whole car would begin to slide sideways.

Much has been written about the necessity of maintaining perfect equilibrium between the two front-wheel brakes, but this is a matter which has given no trouble whatsoever during the year the car has been on the road. From time to time, but at no regular intervals, the front axle was jacked up and the brakes tested. It sometimes happened that a turn or a turn and a half of the thumb screws could be given before equal pressure was obtained on the two drums, but there was never any feeling, even

before these adjustments were made, that the car had a tendency to pull to one side when brakes were applied.

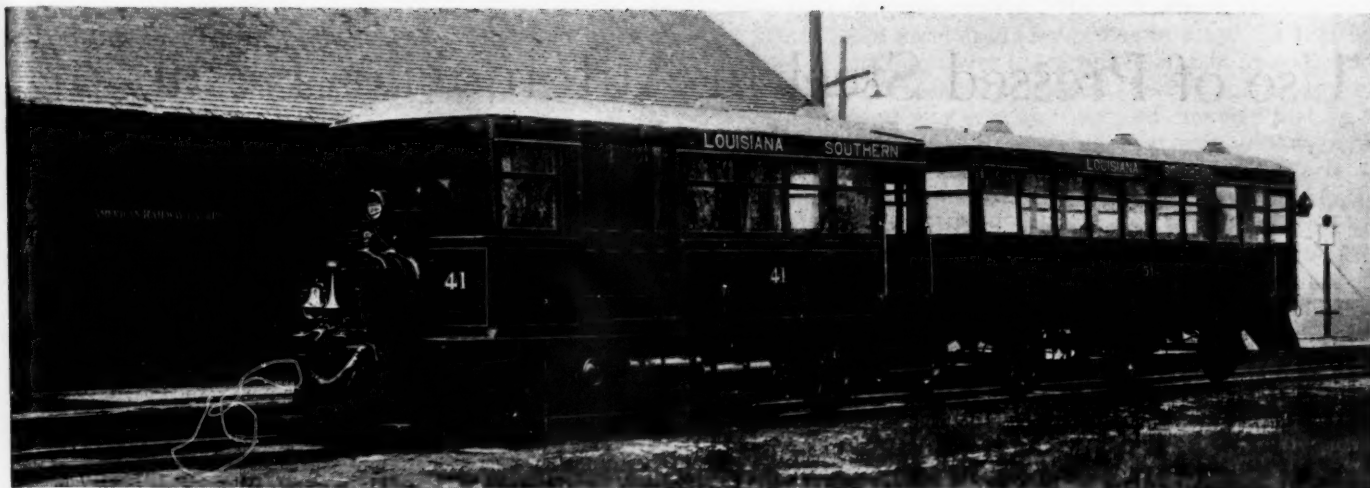
Far more important than perfect equilibrium between the two sets of front shoes is equal air pressure in the two front tires. A difference of pressure which would hardly be felt when holding the wheel manifested itself when the brakes were applied by causing the car to pull to the side of the lower pressure tire. It was found necessary to pay much more attention to tire pressure than to brake equalizing, although, of course, it must not be assumed from this that equalizing should be neglected.

A little additional time each week had to be spent in lubricating the front-wheel brake parts, but with a high-pressure grease gun the expenditure of labor was very slight. More attention was also paid to the front spring shackles than would have been given if there had been no brakes on the front wheels. The only additional mechanical work involved was the changing of the center bolts holding the spring leaves together. After about three months' service it was found that the nuts on the spring clips had slackened off, or the clips themselves had stretched, with the result that the leaves had moved a little, and one center bolt was broken and the other bent. Since this car was delivered, the makers have decided, as an additional security, to use special steel for the center bolts, and to leave a long head recessing well in the axle pad.

All front-brake users should pay close attention to their spring clips, and particularly tighten them up after the first 200 miles have been covered. If wood wedge pieces have been placed under the springs to tilt the axle back, these should be replaced by fiber.

To summarize. Disadvantages on the road, nil. Advantages, a wonderful feeling of confidence because of the braking power held in reserve, and the almost complete elimination of skidding. Additional work in the motor house—probably 15 min. a week for washing with paraffin, and oiling the brake connections, verifying tire pressure, verifying the spring clips, and testing the pressure of the two brakes.

W. F. B.



Gasoline driven railcar and trailer built by the Four Wheel Drive Auto Co. and used on the Louisiana Southern Railroad. Seats for 67 passengers are provided

Gasoline Driven Railcar and Trailer Equipped with Air Brakes

A TRAIN consisting of a gasoline driven railcar and a trailer unit giving a combined capacity for 67 passengers and baggage has been constructed for the Louisiana Southern Railroad by the Four Wheel Drive Auto Co. of Clintonville, Wis. The tractor unit drives to all four wheels and is fitted with Westinghouse air brakes which are arranged to brake also on the wheels of the trailer.

Air is supplied from a compressor driven off the gear-set through a two-pipe system similar to that used in street railway service. There is a direct air system for service application of brakes and an indirect system for emergency application. The compressor has a capacity of 10 cu. ft. per min. and is controlled by an automatic governor. Brake shoes are of cast iron and operate on all wheels.

Springs, of chrome silico manganese steel, are 54 in. long by 2½ in. wide and are connected to the chassis frame by double swing shackles which permit a limited amount of side sway said to be comparable to that given by the swing bolsters in ordinary railway coaches. Axles

are held in place by radius rods which are adjustable to bring wheels into correct alignment.

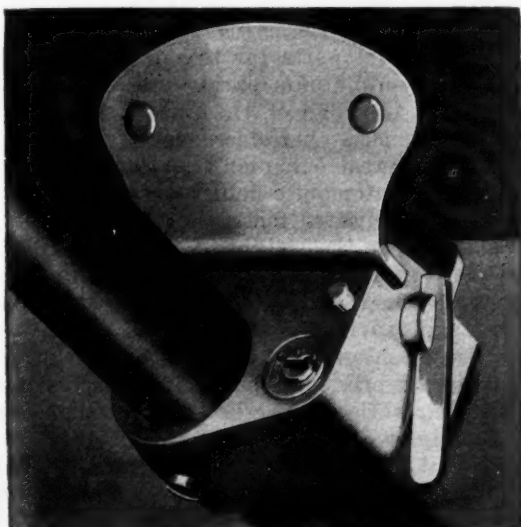
Pressure for feeding gasoline from tank to carburetor is supplied through a reducing valve from the compressed air system. Air valves are used also for control of sanders at each wheel of the tractor unit.

M. C. B. couplers are provided at front and rear of both cars to facilitate switching from one division to another.

A two unit starting and lighting system is fitted. This includes a 270-watt generator and 225 ampere hr. 12-volt storage battery.

Car bodies are approximately 26 ft. in length and are made of wood. The trailer coach seats 40 passengers and the rear half of the tractor coach seats 16, while the baggage compartment has auxiliary seats which accommodate 11 persons.

This train, shown in the accompanying cut, is reported to be in daily use between New Orleans and Shell Beach, a distance of about 40 miles.



Hershey concurrent automobile lock

Combined Switch Lock and Steering Post Bracket

A DEVICE which performs three different functions is being marketed under the name of the Hershey Concurrent Automobile Lock by the Hershey Mfg. Co. It serves as a steering column bracket, as a steering column lock and as an ignition switch, the switch being operated by the same lever and the same motion as used for actuating the lock. A slotted collar around the steering post receives the locking bolt.

A slight movement of the lever turns off the ignition and locks the car. It is impossible to turn on the ignition until the car is unlocked, hence the car cannot be started with the steering gear locked.

This combined lock, switch and bracket has been approved by the Underwriters' Laboratories, we are informed, and has been adopted as standard equipment on the Elgin car.

Use of Pressed Steel in Automobiles Result of Tireless Labor

Interesting sidelights on developments contained in paper on stamping practice read before A. S. M. E. Operations which are common today were evolved only by constant experimentation.

IN automobile manufacture pressed steel parts have been gaining in importance rapidly since large scale production was begun. Some interesting sidelights on this development are contained in a paper on the Development of Modern Stamping Practice, by W. W. Galbreath and John R. Winter, read at the recent meeting of the American Society of Mechanical Engineers.

A typical instance of how pressed steel made a saving for one automobile manufacturer in the early days when chain drives were standard practice is told by a man of many years' experience in the stamping field. This particular manufacturer had a combined sprocket and brake drum for the rear wheels of his car.

The part was made from a casting which was expensive, heavy and difficult to make. But by the proper combination of a pressed drum with a separate sprocket—not so easily worked out as words seem to convey—this pressed steel engineer designed both a better drum and a better sprocket at a lower cost. One can imagine this manufacturer soon looking over his car for other savings pressed steel might bring. In the automobile field the first major parts of a car which were pressed in large quantities were brake drums, then frames, then hubs, and so on until today almost the entire car, body and all, is made of pressed steel.

What to the eye seems a rather simple job of stamping is frequently a task which requires days and days of study and experimenting. The first brake drums produced were made by two drawing operations and had, as the pressed-steel man terms them, "picket fences." In other words, the edge of the flange was not true, but wavy, nor were the drums always perfectly round. Now pressed brake drums are manufactured by one operation.

Variations in Temper and Thickness Troublesome

Today a brake drum must be round within twenty thousandths of an inch, which in a 14-in. drum is surely a very slight variation from a perfect circle. This tolerance would not be difficult if every piece of sheet steel supplied had exactly the same thickness and exactly the same temper, but this is not commercially possible. This very difference, which cannot be overcome, causes stamping manufacturers the most of their difficulties.

Much thought and effort have been expended on the relatively simple process of pressing drums. One large manufacturer, whose plant turns out innumerable brake drums each year, tells of the obstacles that had to be overcome in producing a particular drum with an unusual profile of various sizes. A contract for making these drums (9 in. in diameter) out of 1/8-in. stock was secured. The dies were made and the job went through the plant without a hitch. Then along came a contract for making the same drums 12 in. in diameter out of slightly heavier stock. Every one expected the work to go through with the same facility as before, but unexpected difficulties were encountered.

Cold sheet steel when subjected to several hundred

tons' pressure in a heavy press really flows, or in other words, part of the sheet is stretched to make a thinner wall, and part forced into certain sections to make a thicker wall. In the 12-in. drum the steel did not act at all as it had in the smaller drums and too much metal concentrated at one point. However, after many hours of study and experimenting, perfect drums were finally produced.

But the story does not end here. Shortly after, along came an order for 14-in. drums with the same profile and of proportionately heavier stock. With the previous experience on the 12-in. drums it would seem that no new problem could arise. But it did, for the 14-in. drums did not act at all as had either the 9-in. or the 12-in. and the production of the larger drums had to be studied through just as thoroughly as that of the two smaller designs.

No Known Rule Governs Action of Metal

This particular experience is cited at length to point out that even though two pressed metal pieces appear the same and are used for the same purpose, there is no known rule that can be applied to the action of the metal, when under pressure, which works satisfactorily in all cases.

The production of pressed parts of large size requires infinite patience, coupled with a wide knowledge and experience of the action of steel under various conditions, and an understanding of why and how each job differs from another. Success in the use of pressed parts can be assured only when this experience is employed. Fortunately, there are today a number of stamping organizations in the country that have this ability.

Considerable emphasis has been placed on brake drums in the preceding paragraphs, but the conclusion should by no means be drawn that brake drums are the only pressed parts of an automobile. There are hundreds of pressed parts on every automobile today.

Another one of the interesting phases of the development of pressed-steel parts for this industry is the replacement of cast-aluminum parts. As previously mentioned, lightness was one of the influencing factors in the automobile industry that steel helped to solve.

Before pressed steel occupied the important place it does today in the automobile field, manufacturers turned their attention to lighter metals, chiefly aluminum, in attempting to reduce the weight of their cars. In many instances, however, pressed-steel parts have even excelled aluminum in lightness, not to mention the additional advantage—saving in costs.

In one case an aluminum crankcase bottom was replaced by one of pressed steel. The original casting weighed 13.5 lb., while the pressed steel crankcase which replaced it weighs only 12 lb., or 1 1/2 lb. less than the aluminum part it replaced. Both crankcases are identical in size and accomplish the same purpose, but the pressed steel part made a substantial saving in both cost and weight for the manufacturer.

In the replacement of cast-iron parts by parts made of pressed steel, many savings have been effected in the automobile industry. In one case, where a cast-iron radiator shell was replaced by a pressed-steel one, the material tonnage was cut down by 35 per cent. In addition, many machining operations were eliminated and the parts were delivered to the plant ready for assembling. Moreover, much less weight had to be hauled both in and out of the plant, as well as by the truck during its whole period of usefulness.

A particularly interesting example of the application of pressed steel to the automobile field was furnished by the redevelopment of a double reduction housing cover from cast aluminum to pressed steel. By the very nature of the method of manufacture, a cast part is usually one solid unit. All projections, bosses, etc., can be cast as integral parts of the main member. In considering such a part from a pressed-steel production standpoint, it frequently happens that the cast part has to be viewed

from its component parts. Here is where the ingenuity of the pressed steel engineer comes to play. In this dual reduction housing cover the problem was to provide material for the necessary tapping of the two small openings.

This demand was successfully and cleverly met by the insertion of a steel flange and cast-iron elbow, which provided the necessary tapping facilities. While the weight of the whole part was increased very slightly, this was not a vital factor, and the cost of the pressed part represented a very substantial saving over the cast part. Particular attention is directed to this redevelopment, because many parts that at first are apparent impossibilities for pressed steel redevelopment can be produced by those who are experienced in this work and who recognize that a completed pressed part is often secured by the combination of several different pressed units. The only way of making sure that any part cannot be successfully produced by stamping methods is to submit the part in question to a competent pressed steel engineer.

Westinghouse Adds New Units to Electrical Equipment Line

WESTINGHOUSE ELECTRIC & MFG. CO. recently has announced several additions to its line of electrical apparatus. Among these is equipment now being built for Rolls-Royce, which includes the generator, starter and lighting and ignition switch.

For generator control the Westinghouse company uses either the third brush or the constant voltage regulator system. The latter has been in use more particularly on large and expensive cars, including the Rolls-Royce, Locomobile and McFarlan. The Type FC regulator, which has been used for some time, combines a battery cut-out and voltage regulator in one unit. A diagram of connections of this regulator is shown herewith. The generator is of the plain shunt type and by means of the voltage regulator a resistance is alternately included in this circuit and cut-out by means of a magnetic vibrator.

The magnet of the regulator has three limbs. On the right hand limb is wound the series coil for the battery cut-out and on the central limb the shunt coil for the cut-out, while on the left limb are a series compensating coil and a shunt compensating coil. A resistance mounted inside the regulator is cut into the shunt field circuit when the regulating contacts are open and cut out when the contacts are closed. Connected across this regulating resistance is a condenser in series with an auxiliary resistance. The FC type regulator has jewel bearings for the vibrator arms and is generally a quite elaborate piece of apparatus.

The new LV type regulator operates on the same principle and gives substantially the same control characteristic, but has been simplified so as to make it available for a larger range of cars. The vibrator arm in this type is spring supported.

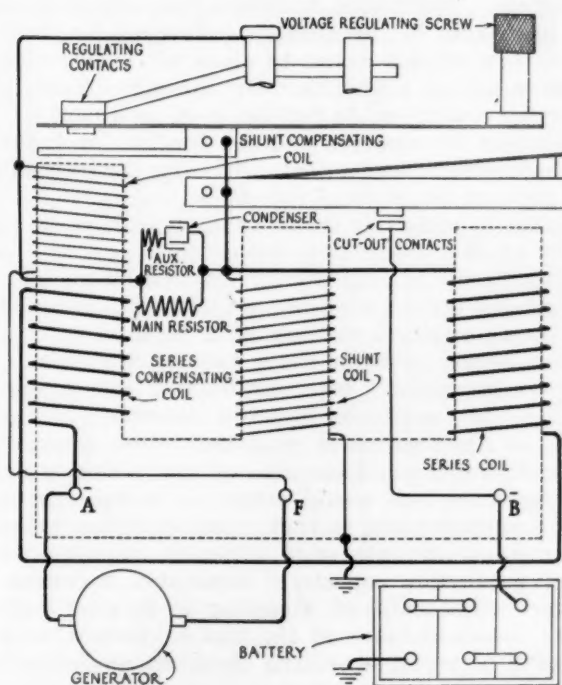
A new starting switch has been brought out which is made up largely of pressed steel parts. It has a micarta base and gives a butt contact, a cross piece connected to the switch button bridging the contact plates in the micarta base. The switch button telescopes the guide, thus preventing the entrance of dust and water.

Two new types of ignition units also have been developed, known respectively as Type D and Type J. These have pressed steel tempered interrupter arms and molded bakelite-graphite cams. The tungsten contact points are crowned (or rounded) which makes it easier to get a good contact. The difference between the Type D and the Type J sets is that the former has a wipe contact in the dis-

tributor while in the latter the spark has to jump from the distributor arm to the segments. Both of these ignition units are furnished either with automatic advance, in which case an A is added to the type designation, or they are without this feature, in which case the type letter is followed by an N.

Another new Westinghouse product is a generator of larger capacity than is required on private passenger cars, for use in motor buses, motor boats and small rail cars. It has an output of 300 watts at a maximum voltage of 15, being intended to operate on a six cell battery. For larger outputs than 120 watts the company prefers to use a higher voltage than that corresponding to three battery cells, as commonly used for passenger car systems.

While in the past a good many Westinghouse generators have been built with plain bearings, ball bearings are now used almost exclusively.



Diagrammatic view of Westinghouse type FC regulator



The FORUM



Offers Practical Plans to Promote Engineering— Production Department Cooperation

Editor, AUTOMOTIVE INDUSTRIES:

I was very much interested in the article by Thomas J. Little, Jr., published in the Forum, commenting upon the lack of practical cooperation between the engineering and production departments. I believe that most executives are aware of this condition but doubt if they fully realize the savings that can be made in production costs by a close cooperation between these two departments.

Mr. Little's suggestion that the engineers visit each other's plants frequently is very good, but I suggest that they go out into their own works first and become more familiar with their own production executives and their troubles. Judging from experience and interviews with production executives, most of them could today make practical suggestions to the engineering department that would materially reduce production costs on many parts.

Too often when engineers are so busy with engineering affairs that they do not have the necessary time to carefully consider at once suggestions from the production department, they make snap decisions to reject the suggestions. Sometimes, however, I am afraid the engineer, in making his decision, is influenced by obstinacy or a narrow-minded desire to show his superiority (?) by enforcing his authority. On the other hand, many production executives do not use good judgment in making requests for changes and are continually bothering the engineering department with impractical suggestions that are many times ridiculous.

In order to avoid this trouble the suggestions and complaints of the production department and the detail drawings from the engineering department should both be approved before they are sent to the other department by an engineer serving as a point of contact, or clearing house, between these two departments. This engineer should have both engineering and production experience and must also be quite diplomatic at times.

Such an engineer could frequently show where slight changes in limits could be made without reducing quality or performance that would materially reduce the quantity of scrapped parts, or that would eliminate an operation or allow the use of a different machine with a greater production capacity. Sometimes a change can be made in the shape of a casting or forging that will greatly reduce the cost of the tool equipment, or allow the use of a rapidly operating clamping mechanism and thus reduce the loading time.

It is often so difficult to maintain alignment in machining castings of a thin section that several light cuts

must be taken, but by a better distribution of the metal, and possibly the addition of a few ribs, sufficient rigidity can be obtained to allow several operations to be combined into one. The casting as originally designed was of sufficient strength to perform its duties in service, but was too weak at some point to resist the stresses caused by a fairly good milling or boring operation, and a slight change would reduce the production time and eliminate the possible breakage of parts. There is practically no limit to the number of possibilities such an engineer would have for reducing costs.

This engineer should preferably be directly responsible to the general manager and not under the supervision of either the production manager or the chief engineer. In cases of dispute between the engineering and production departments he would usually decide the question, although each executive, of course, has the privilege of appealing to the general manager if he desires.

It is usually desirable in a large organization to have several men organized as a separate department to attend to these duties as the volume of the work is so great. One of the largest automobile manufacturers has maintained such a department for several years. In medium-sized concerns one engineer, with sometimes an assistant, can satisfactorily handle these problems. This method is now about to be adopted by a large manufacturer of a quality car. In small concerns the solution of this problem is sometimes more difficult as these duties will not entirely occupy an engineer's time, although many executives will be greatly surprised to see the savings that can be made by such an engineer if his time is but partly occupied.

One method suitable for a small concern is to place the tool designing department under the supervision of the chief engineer, who should also assist in planning production methods in addition to his usual engineering duties. This method is not practical, however, unless the engineer has had some production experience, but there are many engineers who have had some tool designing or production experience who could soon satisfactorily assume the additional responsibility.

The writer knows from personal experience that this method can be used satisfactorily in a small concern as he was connected for six years with one as chief engineer in just such a position. We maintained the closest cooperation between the two departments and, although there were many arguments over our problems, we discussed them frankly and thoroughly and were always able to settle them satisfactorily to all. The writer saved

a great deal in production costs by considering production methods while the parts were being designed, while the tool equipment was being designed and also after production had started. An experienced man can easily save several times his salary in such a position.

Another method that can be used by the small concern is to have a good tool designer who has had some engineering experience serve as the point of contact between the production and engineering departments.

There are, no doubt, many methods of solving this problem that can be satisfactorily worked out, but there can be no argument as to the necessity of a full practical cooperation between the engineering and production departments. Great savings can be made in production costs and in this day of keen competition the concern that pays dividends will have their production costs at a minimum.

ALBERT A. LYMAN,
Chief Engineer, Velie Motors Corp.

Careful Study of Four Wheel Brakes Advocated

Editor, AUTOMOTIVE INDUSTRIES:

In many of the letters published in AUTOMOTIVE INDUSTRIES concerning the four wheel brake, I have found little that has real interest, as the majority seem to be expressions of personal opinions void of fact.

It is true that during deceleration the center of weight is shifted and that, as a result, the pressure of the rear wheels on the ground is lessened. The front wheels are loaded more and their ground contact is increased. Locking of wheels, therefore, is hastened at the rear and delayed in front. Were the ground pressures not changed, the car equipped with four wheel brakes should be twice as safe from skidding as one equipped with rear brakes only, but the shifting of weight should make the four wheel brake car still safer.

With brakes of the same power and the same coefficient of friction, since the area of ground contact is greater at the front wheels, the danger of loss of steering control is remote, as the rear wheels would lock first. It would seem, therefore, that a four wheel system has the advantage over a two wheel system, whether a front wheel, rear wheel or transmission brake.

I believe the mechanical difficulties connected with the installation of front wheel brakes, the danger attendant upon their use, and the importance and complication of equalization have been exaggerated.

There are several inexpensive and dependable designs in use. The accidents due to the abuse of powerful front wheel brakes under abnormal conditions have attracted attention but until the coefficients of friction can be held equal on all brakes, equalization, which controls only the pressure of application, will be of minor importance.

As the control of a car depends upon friction and the maintenance of ground contact, it would seem advisable to develop brake material, tire treads and front wheel brakes.

The mechanical application of front wheel brakes has progressed rapidly but has had to bear the blame of failures due to other defects.

It is obvious that the factor of safety is enhanced by four wheel brakes, and the development of friction materials with a more nearly constant friction coefficient and the proper equalization of pressure is sure to relieve the dangers and congestion of the roads and once more make driving a pleasure.

I have driven cars for twenty years; cars equipped with

rear, transmission, front and four wheel brakes, including designs that were good, bad and indifferent. I have often dragged a Sprague and have studied brake design for years.

As you will see from the above, I am strongly in favor of a sane analytical and unbiased development of all brake devices.

STUART H. CLAPP,
Clapp Engineering Co.

Air Flow Pulsations Affect Metering

Editor, AUTOMOTIVE INDUSTRIES:

At the S. A. E. meeting Mr. Kegereis touched lightly on the question of pulsating flow. It so happened that in the issue of *Engineering* for Jan. 4, 1924, page 7, there is a mathematical analysis by Malter G. Kent of the problem of correcting a venturi meter for pulsating flow. For a sine wave flow the correction factor is shown to be $\pi/2\sqrt{2} = 1.118$. In other words, the meter registers 11.8 per cent too fast.

The reason Mr. Kegereis did not get this increase in richness is that he, like all carbureter investigators, neglected to investigate the phenomenon that takes place at low engine speed, wide open. The average driver always wants his car to climb all available hills on high, hence pulsating flows at low engine speeds at wide-open throttle do play quite an important part in carburetion, and it is reasonable to suppose that some of the loading that takes place under such conditions is due to this effect investigated by Mr. Kent.

Of course, under these conditions there are other factors which tend to make the mixture lean, and it thus follows that a carbureter which shows a very lean mixture at low air flows when tested under steady flow may give quite a satisfactory mixture on the road.

In an article I wrote for *Horseless Age* Aug. 6, 1913, I showed a number of tests, from a study of which it appeared that a leaner mixture is actually required at low engine speed, wide-open throttle, than at high speed, wide-open throttle. This fact was first disclosed by C. H. Taylor's experiment published in the *Horseless Age* in 1908.

S. M. UDALE.

THE use of water glass (sodium silicate) for protecting aluminum when in a cleaning bath has been the subject of experiments made by Rohrig in Germany. The practice widely employed in railroad shops, of cleaning dirty machine parts in a boiling soda or potash solution, involves difficulties in the automobile industry because the solution dissolves aluminum and its alloys.

Most of the aqueous substitutes for cleaning naphtha possesses the same disadvantage, even when applied cold. It was found by the experiments referred to that an addition of $\frac{1}{2}$ per cent of water glass to the soda solution either greatly reduces or entirely eliminates the solvent action.

A protective coating obtained by immersion in boiling soda solution containing waterglass was also effective in cold soda solution. In view of the above discovery Walter Ostwald recommends in *Allgemeine Automobil-Zeitung* that the aluminum parts of the cooling system of an automobile may be rendered immune from the action of solvents by filling the system for the first time, instead of with pure water, with a weak soda solution containing a small addition of water glass.



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Subscription Rates

United States, Mexico and U. S. Possessions	\$3.00 per year
Canada	5.00 per year
All Other Countries in Postal Union	6.00 per year
Single Copies	35 cents

Entered as second-class matter January 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

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Profit Margins Are Slender

FINANCIAL publications which have analyzed the preliminary report of General Motors Corp. on the results of operations in 1923, make much of the fact that in spite of new records in production, dollar volume of sales and net profits, the margin of profit declined from 11 per cent in 1922 to 8.75 per cent last year. This showing was not unexpected and analysis of the reports of many automotive manufacturers would show a similar condition.

"You can't have your cake and eat it, too," is an ancient adage. In other words, you can't give purchasers greater value than ever before and make more money, even with a 75 per cent increase in business, when production costs are running at about the same level, unless your product is standardized year in and year out.

Changing models at least once a year, dictated largely by competitive necessities, is expensive for automobile makers. It was particularly costly for General Motors last year because a good many somewhat radical changes were made in all lines, and more particularly in the Oldsmobile, which was redesigned entirely. All the retooling and other heavy costs incident to these changes were charged to operating costs and taken out of profits.

Nothing is to be gained, however, by attempting to blink at the fact that most motor car makers, especially the large producers, are operating on slender profit margins. A material shrinkage in production or a sharp increase in material costs will make it necessary to readjust retail prices. As a matter of fact, this has been done recently by two General Motors units. It is a condition which all manufacturers should keep in mind.

Ancient Law Works In Old Way

NUMEROUS bank failures in the Dakotas, eastern Montana and the wheat growing sections of Minnesota, need cause little concern to the automotive industry as a whole, although they are likely to limit the sale of its products in that section for some time to come. This financial disturbance is sectional in character and will not spread to other parts of the country. It does demonstrate, however, that reports several months ago of the serious plight of farmers in that district who had staked their all on wheat, were not exaggerated notwithstanding persistent efforts to gloss over the situation.

The troubles both of the banks and the farmers are the result of the inevitable and automatic operation of the law of supply and demand. In the first place there were too many banks. The national average is about one for every 3000 population, but in North Dakota the ratio was one for 800; in South Dakota one for 1100 and in Montana one for 1200. In the second place more wheat was produced than the world can consume. As a consequence individual banks were small and individual farmers had no funds with which to meet obligations long past due.

Some persons attribute the difficulty to a rigid immigration law which has limited the supply of labor and consequent high wages for farm help. Such a contention does not hold water, however, for other sections have prospered in spite of this condition. Fundamentally, the financial flurry works back to reckless speculation in farming land in the flush days which followed the armistice.

Two morals are to be drawn from a distressing situation. One is that one-crop farmers are gambling with nature and the other that the country never can attain all the prosperity to which it is entitled so long as there is a wide discrepancy between the prices a farmer gets for his products and the price he pays for what he consumes.

Air Cleaners Have Proved Their Worth

IF one can judge worth by increasing popularity, air cleaners have established for themselves a place in the sun, for they are now used as standard equipment on five makes of passenger car and are proving popular in truck service also. This has been brought about in the face of opposition on the part of car makers to any increase in equipment the need for which is not abundantly proved, either from a sales or utility standpoint.

Rapid wear of pistons, rings and cylinders has been a normal condition in automotive engines for many years. Since dilution by fuel of crankcase oil

has come to be pronounced, much of the wear has been laid to the resultant decrease in viscosity of the oil, but there is a growing belief that, except under extreme conditions, dilution alone is not so serious as has been thought.

Dilution plus dirt, especially road dust containing abasive material, undoubtedly results in rapid wear and there is not the least question that much dirt enters through the carbureter with the charge of air and fuel and is washed onto the bearing surfaces of rings, pistons and cylinders.

So pronounced is its effect in the case of tractors, which often must operate in clouds of dust a large part of the time they are in use, that air cleaners are regarded as an absolute necessity. With passenger cars and trucks the effect is less only in degree, and since the number of hours' use per year generally is much greater than for most tractors, the rate of wear may be just as great.

It is a well known fact that so-called "carbon" deposits in cylinders contain large percentages of silicon from dust inhaled by the engine. These deposits are said to be much decreased by the use of air cleaners.

Anything which can be done to keep engine oil free from dirt is a step in the right direction when longer wear is desired. Crankcase breather arrangement needs study, but a good air cleaner is desirable in any case.

Try It Yourself Some Cold Night

SERVICE men have often been heard to say that if production and designing engineers had to take care personally of their own cars they would change many things which now are the cause of much criticism on the part of users.

Alcohol and other non-freeze solutions are used in practically all water-cooled cars operated in Northern States during the winter months, and every cold spell brings with it a lot of trouble for the user or those upon whom he calls for help in his difficulties. Often it is considered desirable to increase the strength of the non-freeze solution, and this usually requires draining the cooling system or a part of its contents.

The first step is to find the drain cock, and the second to open it and close it at the desired moment without losing a dollar or two invested in the cooling compound already in use. This is not easy in many cases, for too often the drain cock is not only difficult to find, but frequently clogged. Worse than this, no drain cock is provided on some recent models. Only a pipe plug is employed, and it is almost impossible to drain a part of the cooling system without losing the entire contents or scalding the hands in case the liquid happens to be hot.

Just to cite an occurrence which is not at all unusual, suppose an owner, arriving home after a drive on a cold evening, considers it necessary to increase the strength of the non-freeze solution in the cooling system of the car in order to prevent the possibility of it freezing solid during the night. It is necessary to drain a part of the liquid in the system before

more alcohol can be added. The drain cock or plug is found with some difficulty, but cannot be opened without pliers. To use pliers it is necessary to reach between the crankcase and drip pan and probably get the coat sleeve well coated with grease. When at length enough liquid has been drawn off, the cock must be shut. When a plug is used it is practically impossible to reinsert it without scalding the hand before all the solution is lost.

When and if the job is done, the owner is totally disgusted with the car and with the organization responsible for failure to provide so simple and inexpensive a thing as a drain cock placed where it can be reached easily, and opened and closed without tools.

One Way to Curb Accidents

ASERIOUS effort to minimize jay-walking, everywhere the most prolific cause of traffic accidents, is being made in Trenton, N. J., where a police magistrate imposed a \$5 fine on a man convicted under a section of the city traffic ordinance, after exacting a promise from the culprit that hereafter he would cross streets only at corners. Little attention was paid to the defense, which was that a citizen has a right to cross the public streets wherever he sees fit. If a municipality has the right to regulate the use of its thoroughfares by vehicles, it certainly has the right to lay down reasonable rules for their use by pedestrians, especially when it is done in the interest of public safety.

Belated recognition is being given the fact that the heavy toll of street accidents cannot be reduced materially until pedestrians give greater heed to their own safety. Traffic officers are czars at street intersections and woe betide the motorist who disobeys their signals. It would take an army of patrolmen to prevent jay-walking, but if a few of those who risk their lives deliberately were arrested and fined, the effect would be salutary. Lacking any other punitive measure, officers might charge them with attempted suicide, which is covered by the laws of most States.

Guideposts for Business

ONE of the national economic services, in listing guide posts for business men to follow in mapping their course this year, tells them to watch the trends in the key industries, including building operations, automobile and steel production. The advice is excellent and it is gratifying that the most important manufacturing industry in the country has at last been given some recognition as a factor in the industrial life of the nation. The importance attached to it will increase from year to year.

There can be no particular mystery about the trend of business so long as salient statistics are available. The story will be told by the volume of retail buying, unfilled steel orders and freight car loadings; conditions in the key industries, including our own; a definite trend in commodity prices; the extent of unemployment together with industrial relations in general and to a lesser extent the trend of the stock market.



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FINANCIAL publications which have analyzed the preliminary report of General Motors Corp. on the results of operations in 1923, make much of the fact that in spite of new records in production, dollar volume of sales and net profits, the margin of profit declined from 11 per cent in 1922 to 8.75 per cent last year. This showing was not unexpected and analysis of the reports of many automotive manufacturers would show a similar condition.

"You can't have your cake and eat it, too," is an ancient adage. In other words, you can't give purchasers greater value than ever before and make more money, even with a 75 per cent increase in business, when production costs are running at about the same level, unless your product is standardized year in and year out.

Changing models at least once a year, dictated largely by competitive necessities, is expensive for automobile makers. It was particularly costly for General Motors last year because a good many somewhat radical changes were made in all lines, and more particularly in the Oldsmobile, which was redesigned entirely. All the retooling and other heavy costs incident to these changes were charged to operating costs and taken out of profits.

Nothing is to be gained, however, by attempting to blink at the fact that most motor car makers, especially the large producers, are operating on slender profit margins. A material shrinkage in production or a sharp increase in material costs will make it necessary to readjust retail prices. As a matter of fact, this has been done recently by two General Motors units. It is a condition which all manufacturers should keep in mind.

Ancient Law Works In Old Way

NUMEROUS bank failures in the Dakotas, eastern Montana and the wheat growing sections of Minnesota, need cause little concern to the automotive industry as a whole, although they are likely to limit the sale of its products in that section for some time to come. This financial disturbance is sectional in character and will not spread to other parts of the country. It does demonstrate, however, that reports several months ago of the serious plight of farmers in that district who had staked their all on wheat, were not exaggerated notwithstanding persistent efforts to gloss over the situation.

The troubles both of the banks and the farmers are the result of the inevitable and automatic operation of the law of supply and demand. In the first place there were too many banks. The national average is about one for every 3000 population, but in North Dakota the ratio was one for 800; in South Dakota one for 1100 and in Montana one for 1200. In the second place more wheat was produced than the world can consume. As a consequence individual banks were small and individual farmers had no funds with which to meet obligations long past due.

Some persons attribute the difficulty to a rigid immigration law which has limited the supply of labor and consequent high wages for farm help. Such a contention does not hold water, however, for other sections have prospered in spite of this condition. Fundamentally, the financial flurry works back to reckless speculation in farming land in the flush days which followed the armistice.

Two morals are to be drawn from a distressing situation. One is that one-crop farmers are gambling with nature and the other that the country never can attain all the prosperity to which it is entitled so long as there is a wide discrepancy between the prices a farmer gets for his products and the price he pays for what he consumes.

Air Cleaners Have Proved Their Worth

IF one can judge worth by increasing popularity, air cleaners have established for themselves a place in the sun, for they are now used as standard equipment on five makes of passenger car and are proving popular in truck service also. This has been brought about in the face of opposition on the part of car makers to any increase in equipment the need for which is not abundantly proved, either from a sales or utility standpoint.

Rapid wear of pistons, rings and cylinders has been a normal condition in automotive engines for many years. Since dilution by fuel of crankcase oil

has come to be pronounced, much of the wear has been laid to the resultant decrease in viscosity of the oil, but there is a growing belief that, except under extreme conditions, dilution alone is not so serious as has been thought.

Dilution plus dirt, especially road dust containing abrasive material, undoubtedly results in rapid wear and there is not the least question that much dirt enters through the carbureter with the charge of air and fuel and is washed onto the bearing surfaces of rings, pistons and cylinders.

So pronounced is its effect in the case of tractors, which often must operate in clouds of dust a large part of the time they are in use, that air cleaners are regarded as an absolute necessity. With passenger cars and trucks the effect is less only in degree, and since the number of hours' use per year generally is much greater than for most tractors, the rate of wear may be just as great.

It is a well known fact that so-called "carbon" deposits in cylinders contain large percentages of silicon from dust inhaled by the engine. These deposits are said to be much decreased by the use of air cleaners.

Anything which can be done to keep engine oil free from dirt is a step in the right direction when longer wear is desired. Crankcase breather arrangement needs study, but a good air cleaner is desirable in any case.

Try It Yourself Some Cold Night

SERVICE men have often been heard to say that if production and designing engineers had to take care personally of their own cars they would change many things which now are the cause of much criticism on the part of users.

Alcohol and other non-freeze solutions are used in practically all water-cooled cars operated in Northern States during the winter months, and every cold spell brings with it a lot of trouble for the user or those upon whom he calls for help in his difficulties. Often it is considered desirable to increase the strength of the non-freeze solution, and this usually requires draining the cooling system or a part of its contents.

The first step is to find the drain cock, and the second to open it and close it at the desired moment without losing a dollar or two invested in the cooling compound already in use. This is not easy in many cases, for too often the drain cock is not only difficult to find, but frequently clogged. Worse than this, no drain cock is provided on some recent models. Only a pipe plug is employed, and it is almost impossible to drain a part of the cooling system without losing the entire contents or scalding the hands in case the liquid happens to be hot.

Just to cite an occurrence which is not at all unusual, suppose an owner, arriving home after a drive on a cold evening, considers it necessary to increase the strength of the non-freeze solution in the cooling system of the car in order to prevent the possibility of it freezing solid during the night. It is necessary to drain a part of the liquid in the system before

more alcohol can be added. The drain cock or plug is found with some difficulty, but cannot be opened without pliers. To use pliers it is necessary to reach between the crankcase and drip pan and probably get the coat sleeve well coated with grease. When at length enough liquid has been drawn off, the cock must be shut. When a plug is used it is practically impossible to reinsert it without scalding the hand before all the solution is lost.

When and if the job is done, the owner is totally disgusted with the car and with the organization responsible for failure to provide so simple and inexpensive a thing as a drain cock placed where it can be reached easily, and opened and closed without tools.

One Way to Curb Accidents

ASERIOUS effort to minimize jay-walking, everywhere the most prolific cause of traffic accidents, is being made in Trenton, N. J., where a police magistrate imposed a \$5 fine on a man convicted under a section of the city traffic ordinance, after exacting a promise from the culprit that hereafter he would cross streets only at corners. Little attention was paid to the defense, which was that a citizen has a right to cross the public streets wherever he sees fit. If a municipality has the right to regulate the use of its thoroughfares by vehicles, it certainly has the right to lay down reasonable rules for their use by pedestrians, especially when it is done in the interest of public safety.

Belated recognition is being given the fact that the heavy toll of street accidents cannot be reduced materially until pedestrians give greater heed to their own safety. Traffic officers are czars at street intersections and woe betide the motorist who disobeys their signals. It would take an army of patrolmen to prevent jay-walking, but if a few of those who risk their lives deliberately were arrested and fined, the effect would be salutary. Lacking any other punitive measure, officers might charge them with attempted suicide, which is covered by the laws of most States.

Guideposts for Business

ONE of the national economic services, in listing guide posts for business men to follow in mapping their course this year, tells them to watch the trends in the key industries, including building operations, automobile and steel production. The advice is excellent and it is gratifying that the most important manufacturing industry in the country has at last been given some recognition as a factor in the industrial life of the nation. The importance attached to it will increase from year to year.

There can be no particular mystery about the trend of business so long as salient statistics are available. The story will be told by the volume of retail buying, unfilled steel orders and freight car loadings; conditions in the key industries, including our own; a definite trend in commodity prices; the extent of unemployment together with industrial relations in general and to a lesser extent the trend of the stock market.

Campaign Launched for Repeal of Taxes

Calls Made on Members Are Being Supplemented with Arguments by Mail

WASHINGTON, Feb. 14—The fight of the automobile industry for the repeal of the excise and so-called "nuisance taxes" was taken up in earnest this week simultaneously with the consideration of the tax bill by the House and its consideration of the Ways and Means Committee's report, which was made last week and which rejected all relief asked for by the users and manufacturers of automobiles.

The actual consideration of the bill will begin tomorrow. During the last four days of this week members of the Ways and Means Committee and of the House have undergone probably one of the most intense bombardments ever leveled by any industry.

Representatives of practically all of the organizations of the automobile industry and allied industries are here. These include the following:

Organization Chiefs There

The National Automobile Chamber of Commerce, represented by Alfred Reeves, general manager; Pyke Johnson, Washington representative of the organization, and C. C. Hanch, vice-president of the chamber and chairman of the Legislative Committee.

The Motor and Accessory Manufacturers Association, represented by M. L. Heminway, general manager.

The Automobile Body Builders Association, represented by Carry E. Quinn, legislative representative.

The Rubber Association of America, represented by A. L. Viles, secretary and general manager.

The National Automobile Dealers Association, represented by C. A. Vane, general manager.

The American Automobile Association, represented by Thomas P. Henry, president, and Ernest Smith, general manager.

The National Motorists Association, represented by Fred H. Caley, executive secretary, and Raymond Beck, manager.

Personal Calls on Members

Working as a committee, representatives of the automobile manufacturer, the automobile dealer, and automobile and truck user, along with the accessory and tire manufacturers and users, those named are devoting their entire time making personal calls on members of the House to lay before each member an oral argument for the repeal of the excise taxes, in whole or part.

This work is then being supplemented by the mailing each day to each Congressman of one piece of literature, telling him why the taxes should be lessened and presenting in visual form what the excise taxes mean to the automobile in-

Business in Brief

NEW YORK, Feb. 13—Despite adverse weather in all sections of the country, general trade conditions show more activity, with buying by the retailers conservative and cautious. In the Northwest the excitement over restriction of credits seems to be dying out, and there is a more cheerful tone there because of the plans being made to extend aid to financial and farming interests, and also because it is expected the wheat tariff may be advanced further.

In industry there is good buying of steel by railroads, implement and automobile makers, with Japan's reported plans for more buying for reconstruction purposes as an added incentive. Pig iron prices are firmer and higher and sales larger. In the Pacific Northwest lumber is selling stronger, but in the East it is more quiet after the recent rise. Raw wool is dull in this country, but the foreign markets show strength and activity. Weather has helped the western coal business.

Following a slow spell, there has been some increase in activity in textiles, the dry goods markets displaying a slightly better tone.

January building activity has been marked, favored by the open winter. The value of the building permits issued in January is not so great as in December, but is better than in January, 1923, the decrease being about 11 per cent.

An increase in speculative buying shoved grain prices to new levels for the season, wheat, corn and oats holding the center of the stage.

dustry and why they should be repealed, in part at least.

As an example of the manner in which the fight is being made, a toy truck, with one wheel broken off and included in the package, is being mailed to each member of the House and Senate. With this toy automobile is a placard reading as follows:

"This is what happens when an automobile owner or truck driver suffers a misfortune. His wheel is broken, as you see. It must be repaired. Congress taxes him 5 per cent on the cost of replacement. This is nothing in the world but a tax on misfortune."

The office of the House Ways and Means Committee with this visual demonstration of broken chassis, fenders, wheels and bodies, looks like a miniature garage and has probably been the most effectual piece of "argument" advanced thus far.

Every day the mail of each congressman carries him a piece of literature from either the A. A. A., the N. A. C. C.

(Continued on page 361)

February Promising New Output Records

Operations Are Greater Than in January, Though All Plants Are Not at Capacity

NEW YORK, Feb. 11—Production is continuing at a high level with car, truck and parts makers, pointing to new output marks for February in those branches of the automotive industry. Parts sales are reported in good volume and plants in many cases are operating at capacity. Prospects for continuance of strong operations with parts makers for the first half of the year show no change from earlier anticipations.

Conditions in the parts branch reflect the activity prevailing with motor vehicle producers. Automobile makers generally have not yet fallen into the stride that marked the best months of last year but they are gradually approaching it, with the likelihood that they will reach it the latter part of this month or the first of next.

The industry as a whole is operating on larger schedules than were followed in January. Ford production in the United States during February will hover at the 170,000 mark achieved in January and will not reach the 10,000 daily point in output for several months, or until greater manufacturing facilities now under way are completed.

Various Factors Help Sales

Sales of automobiles are holding up exceptionally well, due to the impetus given by shows, the mild winter in some sections and the widespread feeling that the year will be one of good times. Shows are attracting a larger number of visitors than in other years. Those in the Northwest are drawing good crowds from urban centers and at the same time sufficient interest is being displayed among the outlying population to indicate that there is no decline in interest with the farmer buyer.

Present demand and encouraging outlook for spring business are the factors that justify the manufacturer in keeping plants at a high operating point. While stocks are accumulating to prevent a shortage when the biggest sales season of the year starts, producers are taking every precaution against flooding the market.

Truck makers are stepping up schedules but are evidencing the same conservatism that featured last

(Continued on page 361)

Inquiry to Be Made Into Gasoline Prices

President Orders Investigation—
Federal Control Suggested
by A. A. A.

WASHINGTON, Feb. 14—An immediate investigation into the causes for increased gasoline prices in South Dakota and other States where prices of gasoline have been increased has been ordered by President Coolidge. The Federal Trade Commission will make the investigation which is being instigated in South Dakota by the Governor of that State, who wrote President Coolidge in regard to the situation.

In connection with the inquiry, Huston Thompson, chairman of the Federal Trade Commission, has written the President the following letter:

Your letter of Feb. 7 transmitting wire of Feb. 6 from the Governor of South Dakota and asking that the commission make an immediate investigation of the gasoline situation was received this morning and presented to the commission.

In reply I have been requested to say that the commission will make an immediate investigation of the conditions described by Governor McMaster.

It was announced at the White House that the President had also directed the Department of Justice to inquire into the charges of the South Dakota Governor that interests allied with the Standard Oil Co. had cornered the oil supply, and thereby were increasing prices without justification. The Department of Justice announced that similar investigations in gasoline are being made in other States.

Henry Writes Coolidge

In a letter of commendation to the President, Thomas P. Henry, president of the American Automobile Association, declared that Government regulation of the price of gasoline offered the only solution and the best protection of the interests of motorists in the gasoline problem. Mr. Henry called the attention of the President to the fact that the increases in gasoline price made during the last six months, if maintained, means an approximate annual increase of \$300,000,000 in the cost of operating the motor vehicles of the country.

The fullest cooperation of the A. A. A. and all of its affiliations was pledged to the President, the Department of Justice and the Federal Trade Commission, by Mr. Henry, who declared that the people, and especially the motorists, are entitled to know the real reasons, if any exist, for the price being from 2 to 6 cents higher in one section than the price quoted in an adjoining territory and why the price can be arbitrarily increased in certain sections over night.

Cash Dividend by Standard Oil

CHICAGO, Feb. 11—The price of gasoline was increased from 18 cents to 20 cents a gallon to patrons of the service

Market Should Be Thoroughly Analyzed if Benefits of Advertising Campaign Are to Be Realized

AN INTERVIEW WITH VERNE BURNETT,
Secretary of the Advertising Committee of the General Motors Corp.

By D. M. McDonald,
Detroit News Representative of the Class Journal Company

DETROIT, Feb. 13.

WITH appropriations for advertising mounting to new high figures in the industry nearly every year, Verne Burnett, secretary of the advertising committee of General Motors Corp., suggests the thought that mere extent of expenditure involved does not augur for success in the campaign, but rather that it invites the more searching inquiry as to the market and the media to be employed.

More money for advertising, the rule this year in almost every successful company in the industry, imposes upon the advertising director, Mr. Burnett said, the justification of every dollar that will be spent.

Development of the larger markets toward which the industry is working requires more than ever constructive analysis of the markets so that the full strength of the advertising effort may be directed at the vulnerable points. No company can afford, Mr. Burnett said, to undertake the development of any market without having thorough information as to its possibilities, and this can be gained only through intensive and individual analysis.

Every company in the industry might well make a careful survey of a group of what it considers typical prospects, the larger the group the better, but not smaller in number than one thousand, so that it will have a complete detailed knowledge of the individual preferences and buying possibilities of every member of such a group. One thousand individuals so consulted should help furnish a background of sufficient amplitude for a thoroughly successful campaign, as experience has shown, said Mr. Burnett, that the tastes and preferences of one group of a thousand will average up with those of any other similar group.

Advertising effort should be more a matter of exact knowledge of markets, and conditions influencing and affecting those markets, each year. Appropriations should represent a scientifically determined figure, in which the cost of marketing, including advertising, is prorated over the total volume of business than can reasonably be expected. Unless a program can be laid out thus it is unsound at the start.

The old hit or miss methods of determining advertising plans have no place in the industry today. Every company should figure just how much business it is warranted in expecting, how much it can handle when developed, and for that reason should plan in advance just how much money it should have available to spend over any given period.

Here is a fact which one careful analysis of a market proved: The influence of women in the purchase of automobiles makes it highly important that their support be enlisted either through separate campaigns in media circulating largely among women, or that their attention and interest be stimulated by detailing features most likely to interest them in the general media.

If the future automotive advertising is based on clearer thinking and more careful analysis it will reflect credit on the entire industry.

stations of the Standard Oil Co., Feb. 5. A cash dividend of 62½ cents on every share of its capital stock was also announced by the company.

Price Advance Since First of Month

NEW YORK, Feb. 11—The average price of gasoline has advanced 1 cent per gallon since the first of the month in thirty representative cities, standing at 18.13 cents the latter part of last week. This is an advance of 5.44 cents from the 1923 low average of 12.69 cents. The 1923 high average was 21.11 cents. The lowest price shown last week was 14 cents at Tulsa, Okla., and the highest 23.2 at Des Moines.

Reasons given for the advance are the continued decline in crude oil output in flush fields and less competition by California products with mid-continent oil and gasoline in eastern markets.

Standard Screw Products Disposing of All Assets

DETROIT, Feb. 13—Standard Screw Products Co. is selling off all its assets, including land and buildings, at a general liquidation sale now in progress. The company has been in business since March, 1913, manufacturing screw machines and electric welded products for the automotive industry almost exclusively.

It was determined to liquidate in December, last, owing to general competitive conditions in the industry. Officers are E. E. Keller, president; W. F. Evans, vice-president and general manager, and F. P. Reinhart, secretary and treasurer.

The equipment of the factory includes general machine shop equipment with a stock of unworked material and small tools.

Winton Motor Stops Manufacturing Cars

Decision to Liquidate, However, Does Not Affect Diesel Engine Production

CLEVELAND, Feb. 11—The end of the long and honorable career of the Winton Motor Co. as a manufacturer of automobiles is to come soon. The announcement has been made at the factory that the entire plant, including the buildings, is for sale, and that the company is to be liquidated.

The servicing of Winton cars will be carried on by the General Parts Co. of Flint, Mich., which has purchased the servicing department maintained at the factory. This includes all dies, machinery and other equipment. Until the buildings are sold the General Parts Co. will maintain the service at the factory quarters. Quarters will be taken later in another part of the city for this work.

Indebtedness to Be Paid

Proceeds from the sale of machinery, buildings and plant equipment will be used to pay bank indebtedness and extended merchandise creditors. Enough is expected to be realized from the automobile business to take care of this indebtedness.

The sale of the machinery has been let to a broker, and persons desiring to purchase may write to the plant. The buildings, said to be thoroughly modern for the purpose, are held at \$550,000. Only twelve new cars made by the company remain unsold.

The Diesel engine business that is carried on by the same company is not affected by the liquidation of the automobile manufacturing business. This is profitable.

The liquidation of the Winton Co. marks the passing of a concern which has existed since the inception of the industry; in fact, it is a matter of record that it sold the first American-built car, the purchaser being Robert Allison of Port Carbon, Pa., who bought a one-cylinder type on April 1, 1898.

Founded by Alexander Winton

Alexander Winton, who has been president since the organization of the company in March, 1897, came into the industry from the bicycle business in which he was a powerful factor as manufacturer of the Winton bicycle. He carried with him the same force and business acumen that had made him prominent as a maker of two-wheeled vehicles. This was demonstrated by his activities in showing the possibilities of the automobile by means of cross-country runs and racing.

It was Alexander Winton who took a team to Europe to represent America in the James Gordon Bennett cup race in Ireland in 1903; driving himself, while his team mates were Louis Moers, his engineer, and Percy Owen, recently ap-

pointed chief of the automotive division of the Department of Commerce. On the dirt tracks and the beach at Ormond, Winton racing cars made history twenty years ago and the work of Barney Oldfield and Earl Kiser in the early Winton Bullets will not soon be forgotten.

The Winton Co. prospered for years, being ranked among the leaders. With automobile manufacture as its main asset, it also developed the manufacture of gas and oil engines of the Diesel type, which part of the business will survive, it is said.

A few years ago, however, the company became financially embarrassed and its affairs were turned over to the banking interests which have been in charge since. For a time it looked as if the automobile end could be rescued, but recently when the merger, which included Haynes and Dorris, fell through, and after two or three other attempts had been made at refinancing, it was decided that it would be best for all parties involved to liquidate.

The Winton Co. has a capital stock of \$1,000,000 common and \$1,500,000 7 per cent cumulative preferred, of which there is outstanding all of the common and \$1,350,000 of the preferred. The company has no funded debt.

The same three chief executives—Alexander Winton, president; Thomas Henderson, vice-president, and G. H. Brown, secretary—have held office since the company started, the other directors being C. S. Weller, Charles W. Bailey, C. E. Farnsworth, Edward McEwen, E. B. Greene and William G. Dietz.

Ford Plans to Increase Production 15 Per Cent

BOSTON, Feb. 11—Interviewed today at the famous Wayside Inn, near Boston, which he recently purchased, Henry Ford told a Dow, Jones & Co. representative that he is planning for a 15 to 20 per cent increase in the production of Ford and Lincoln cars and Fordson tractors, which will make his 1924 output somewhere between 2,500,000 and 2,600,000 for all his plants here and abroad, in comparison with 2,200,000 last year.

"Such has been the pressure for transportation for our products from our New York plants to New England that we now are shipping by our own boats and by the same methods from Albany to New York," said Mr. Ford. "We have in mind decentralizing manufacturing activities somewhat."

"We have enough men in Detroit now. We employ there between 115,000 and 120,000."

SUPERIOR CORUNDUM SALE

WALTHAM, MASS., Feb. 11—The Superior Corundum Wheel Co.'s plant is to be sold as a going concern at an auction, scheduled to be held here Tuesday morning, Feb. 26. In addition there will be auctioned other parcels ordered sold by Robert G. Dodge, receiver of the International Abrasive Corp., National Abrasive Co. and the Harrison Supply Co.

Harroun Plant Sold to Gotfredson Truck

Output Will Be Increased—Is Step in Plan for National Distribution

DETROIT, Feb. 11—Gotfredson Truck Corp. has bought the plant of the former Harroun Motors Corp. at Wayne, near Detroit, to which it will remove its factory equipment from the present plant here, and will make this present plant its service headquarters for the Detroit district. The company will be ready for manufacture in the new plant within the next three or four weeks.

Taking over the new plant, which gives it about 200,000 ft. of manufacturing space, the Gotfredson company will make large increases over its present production schedule, but is unable to declare at this time how extensive these increases will be. It means, however, company officials said, that the company is ready to go in for largely increased distribution and is a step in the plan to build trucks for national distribution.

The recent location of a factory branch in Southern California will be followed by the location of other branches in important distribution territory, it is declared. In the main the company will adhere to this policy of distributing its product and will extend its organization to the smaller communities from the branches. A full line of trucks now is being manufactured.

The Harroun plant, built to house the company organized by Ray Harroun, former race driver, to manufacture passenger cars, never got into production on the car for which it was planned. The factory was taken over for war work as car production was to get under way, and only within the last year has it been made available for other work. In the meantime the Harroun company had succumbed to financial difficulties, its affairs being taken over by the Guaranty Trust Co. of this city.

More Stars and Durants to Be Built at Lansing

DETROIT, Feb. 11—Production of Star and Durant four models will be increased to about 400 daily by March 1 at the Durant Co. of Michigan plant, at Lansing, according to Hal W. Alger, vice-president and general manager. The company has been approximating 300 daily, and with the start of a new assembly line will increase its output to the new figure. Star models will form more than 75 per cent of the total.

The Lansing factory, which serves all the territory between the Allegheny and Rocky Mountains, is reported to have closed the last of its open distributing territory during the Chicago show and now has about 2000 dealers. The factory built 55,050 Star cars during 1923, the sales value of which was \$23,000,000.

Paige-Detroit Earned \$8 Share Last Year

Business Totaled \$46,296,606, an
Increase of 45.83 Per
Cent Over 1922

DETROIT, Feb. 11—Paige-Detroit Motor Car Co. business in 1923 totaled \$46,296,606, an increase of 45.83 per cent over 1922. Profits after all inventory adjustments, were \$3,180,971, an increase of 55.81 per cent.

The company shipped 42,860 cars during the year, an increase of 44.12 per cent.

The company paid \$185,024 in preferred stock dividends during the year, at the rate of 7 per cent, and \$480,000 in dividends on the 4,000,000 common then outstanding, or at the rate of 12 per cent. Earnings were approximately \$8 per \$10 par share, President H. M. Jewett said in his statement to stockholders, these representing, however a relatively small profit per car. Dividends on common represented \$11.20 per car shipped.

During the past year, Mr. Jewett said, the new plant was built and equipped for \$1,609,363, paid out of profits.

"We believe it is the most modern and most efficient automobile plant in the world," he said. "It is devoted exclusively to Jewett production and has capacity for 500 cars daily."

"Last year we did not have plant capacity to build Paiges in addition to Jewetts on a quantity basis. Now with the Jewett in its new home the main plant is devoted to Paiges with a capacity for 150 cars daily. The large increase in capacity, with consequent lowering of overhead, makes possible the much lower price at which the new Paige is sold."

"Outlook for 1924 business is most promising. Our schedule for the first six months is 86 per cent larger than during the same period last year. Shipments during December and January have already been 90 per cent greater than during the same two months a year ago."

All members of the board of directors were re-elected at the meeting.

Gardner Tour de Luxe Is to Sell for \$1,045

ST. LOUIS, MO., Feb. 13—A new Gardner Tour de Luxe has been announced to sell for \$1,045. It is mounted on the standard Gardner chassis and is equipped with cowl lights, nickeled radiator, double-barred front bumper, aluminum trunk rails and other added equipment. The body is finished in black enamel, and the top is covered with black double texture material. Upholstery is in plaited black leather.

W. W. TOTMAN DIES

HARTFORD, CONN., Feb. 11—W. W. Totman, field representative for the last twenty years for the Whitney Manufac-

turing Co. of this city, died in the Hartford Hospital Thursday. Before joining the forces of the Whitney company, Mr. Totman obtained a valuable mechanical experience with the Pratt & Whitney Co., Boston Gear Works and Fellows Gear Shaper Co., becoming one of the best known sales representatives in the automotive industry.

White Denies Report It Will Produce Car

CLEVELAND, Feb. 11—Denial is made by the White Co., which now confines itself strictly to the manufacture of trucks and buses, that it intends to resume the manufacture of passenger cars, directly or indirectly. It is thought the rumor started because R. H. White, now chairman of Rollin Motors, was at one time a prominent executive of the White Co., although he has not been identified with White for ten years.

An official statement from the White headquarters states that neither the company nor its officials or factory personnel has any connection whatsoever with the Rollin Motors Co. or any other passenger car producer.

Marathon Tire Factory Re-opened by Receiver

AKRON, Feb. 13—Marathon Tire & Rubber Co., which has been placed in the hands of W. F. Jenks, its president, as Federal receiver, has started production of tires on a small scale.

The plant had been shut down for a short period pending the appointment of the receiver and also for inventory-taking and the making of minor repairs.

Attorneys representing the company stated at the time the receiver was appointed that, in spite of \$400,000 liabilities, the company was absolutely solvent and would be able to refinance and right itself in a few months.

Firestone Balloon Tire Output to Be Increased

AKRON, Feb. 13—Harvey S. Firestone, president of the Firestone Tire & Rubber Co., in an announcement stated that he believes the balloon tire in a comparatively short period will entirely supersede the present standard tires for passenger car purposes.

The company, Firestone states, is, therefore, rapidly expanding its facilities for the production of this type of tires to keep pace with the constant increase in demand.

DURANT MOTORS MOVES

NEW YORK, Feb. 11—General headquarters of Durant Motors, Inc., have been moved from the Gotham National Bank building at Broadway and Fifty-ninth Street to the Fisk Building at 250 West Fifty-seventh Street, in which also is housed the Durant bank, the Liberty National Bank in New York. President W. C. Durant and his chief executives are located on the twenty-fourth floor.

Murray-Ohio Leases Torbensen Factory

Obtains Option to Purchase—
Eaton Would Consolidate Business in One Plant

CLEVELAND, Feb. 13—In order to provide greater manufacturing facilities, the Murray-Ohio Co., parts maker, has acquired an option on the Torbensen Axle Co. property at 1115 East 152nd Street. The deal involves a consideration of between \$400,000 and \$500,000.

At present the Murray-Ohio Co. has about 80,000 sq. ft. of floor space in four buildings, while in the Torbensen plant it will have 150,000 sq. ft. on one floor, thereby enabling it to increase both production and efficiency.

Under the deal just closed the company leased the plant with an option to purchase by April 1.

When the purchase is consummated, and it is believed it will be, Eaton Axle will consolidate its axle business into one local plant. The Torbensen was consolidated with Eaton some time ago. The Eaton company will continue to make both axles in the single plant after the change is made.

C. W. Hannon, vice-president and general manager of the Murray-Ohio Co., stated that his corporation would be in production in the new plant about May 1.

J. O. Eaton, president of the Eaton Co., stated that the sale to the Murray company contemplates only real estate and some fixtures. The machinery already has been moved to the Eaton axle plant.

Plan Holding Company for Bus Line Merger

NEW YORK, Feb. 11—It is expected that within a week some definite announcement will be made regarding the bus merger now pending, which involves the Fifth Avenue Bus Co., the Chicago Motor Coach Co. and the St. Louis Motor Coach Co. John Hertz of Chicago, one of the most prominent figures in the deal, is away from his Chicago office, but when he returns, which will be in about ten days, it is thought the deal will be ready for announcement.

In preparation for the merger it is said that the Omnibus Corp. of America, to be a holding company, is in process of formation. It is reported that this corporation will offer its stocks in exchange for the securities of the New York and Chicago companies, the total new capitalization to be 635,000 shares of no par value common and preferred stock, to the amount of the Chicago Motor Coach preferred stock offered for exchange.

The Chicago concern already has an interest in the St. Louis company. It also is said that San Francisco interests are likely to come into the merger, making it a four-cornered affair.

Pierce Reports Net Profit of \$372,712

Current Assets Total \$13,265,325
and Current Liabilities
\$3,723,286

BUFFALO, Feb. 13—The annual report of the Pierce-Arrow Motor Car Co. for the year ended Dec. 31 is one of the most favorable issued in several years. Profit from operations for the year, after deducting all expenses of the business, including cost of experimental work, was \$1,732,391. After making provision for depreciation, interest on bank loans and debenture there remains a net profit of \$372,712. Dividends amounting to \$94,500 were paid on the prior preference stock, leaving \$278,812 to be added to surplus.

The report of President Myron E. Forbes shows current assets of \$13,265,325 as against current liabilities, including bank loans, of \$3,723,286. This is a ratio of 3.5 to 1, as against a ratio of 2.7 to 1 at the end of 1922. Mr. Forbes stated to the members of the board that since Dec. 31 the bank loans had been further reduced by a payment of \$750,000, which increased the ratio to 4.2 to 1.

In speaking of its new bus chassis, the report says:

"Our demonstration trips have aroused the keenest enthusiasm among motor bus users and operators, and although the chassis was only placed in production during the last quarter of the year, we have already received a substantial number of orders. It is our opinion that the new bus chassis will soon become an important factor in our volume of output."

The report refers to the prospect of a new model as follows:

"For some time our experimental and engineering departments have been engaged in the development of a new model passenger car of a lighter type than our present model. At the present time the company is not in position to make any definite announcement; it can be stated, however, that should we produce a lighter car, as a companion to the present model, its manufacture will in no way affect the present Pierce-Arrow car."

Rutherford's Program for Economies Taken Up

NEW YORK, Feb. 11—At the second day's session of the Tire Manufacturers Division of the Rubber Association of America held here last week there was considerable discussion of President Rutherford's proposed program calculated to effect in the rubber industry economies amounting to \$30,000,000 annually and it was agreed to form committees charged with preparing detail plans for putting various phases of the program into effect.

Another committee is studying the question of guarantees for balloon tires. One proposal is said to contemplate limit-

ing the period of the guarantee against defective material and workmanship to ninety days from date of sale.

Two typographical errors appeared in the table of balloon tire sizes as published in these columns last week: 31 x size incorrectly printed "34 x 4.40" 5.77 in. size fits a 21 in. (not 20 in.) rim; should read "30 x 4.40."

In explanation of the action taken regarding tire standardization, General Manager A. L. Viles of the Rubber Association has issued the following statement:

The fact that automobile manufacturers, despite the determined efforts of tire manufacturers to adhere to the recommended list of standard balloon tire sizes, are demanding sizes of balloon tires other than those recommended by the Tire Executive Committee as standard, causes the executive committee on Feb. 6 to consider further the subject of balloon tire standardization.

It is the opinion of the Executive Committee that the automobile industry is in a period of transition with respect to the trend toward smaller diameter wheels. Many car manufacturers, because of material and equipment conditions, are unable to see their way clear to redesign present products so as to use only the balloon tire sizes that have been recommended as standard by the Tire Executive Committee. The committee believes, however, that the question of balloon tire standardization gradually will work itself out in the direction of small diameter rims and a lesser number of cross sections for each tire size.

Jordan Offer of Common Stock Oversubscribed

NEW YORK, Feb. 14—Banking interests which offered 42,000 shares of the Jordan Motor Car Co.'s 126,000 outstanding no par value common stock at \$31, announce that the issue has been oversubscribed.

It is expected that Jordan stock will be traded in on the New York Curb next week, and application has been made to have it also listed on the New York Stock Exchange. Proceeds of the new financing will be used for additional working capital, and the sum of \$200,000 will be set aside to retire preferred stock, of which \$1,200,000 is outstanding.

It is announced that Jordan earnings for the first eleven months in 1923 aggregated \$777,236, compared with \$502,640, for all of 1922. The 1923 profits were equivalent to approximately \$6 a share on the 126,000 shares of common stock. Dividends are expected to be started on the new stock at the annual rate of \$3 a share, which is equivalent to \$21 a share on the old stock.

The company has no funded debt and owes nothing to banks, it is stated.

DORRIS TO BE DISSOLVED

ST. LOUIS, Feb. 14—The Circuit Court has ordered the dissolution of the Dorris Motor Car Co., the order being made on an application of a group of stockholders headed by H. B. Krenning. Simultaneously the court denied an application for a receiver made by an opposition group of stockholders.

Chrysler Is Named Maxwell President

Succeeds W. R. Wilson — Net Profits of Maxwell-Chalmers Put at \$2,677,851

DETROIT, Feb. 14—Walter P. Chrysler, chairman of the board of directors of the Maxwell Motor Corp., was given an additional title at the company's annual meeting—that of president, to succeed W. R. Wilson, resigned.

The report on 1923 business showed consolidated net profits of the combined Maxwell-Chalmers companies of \$2,677,851, after allowing for interest and depreciation. This also includes the deduction of Chalmers operating losses of \$878,459. The earnings, after making allowance for the dividend requirements on the 8 per cent Class A stock, were equivalent to \$1.90 a share on the outstanding 609,430 no par Class B shares.

Total assets were \$58,725,752, against \$55,781,185 in 1922. They include land and plant, \$15,507,452, and good will, \$25,030,296. Inventories were \$12,024,158. Among the liabilities are included accounts payable, \$2,591,425, compared with \$1,095,016 the previous year.

A comparison of the income account of 1923 with that of 1922 follows: Profit, after interest and depreciation, \$3,556,310, against \$2,018,265; net loss of Chalmers Motors and subsidiaries, \$878,459, compared with \$1,186,603; net profit, \$2,677,851, against \$831,662; adjustments, \$17,300, contrasted to \$166,892, the latter including \$138,920 adjustment debit item; surplus, \$2,695,151, against \$720,714.

It also was reported that in 1923 the Maxwell company sold 58,000 Maxwell cars, 800 trucks and 8300 Chalmers cars. Announcement was made that the corporation would pay off the balance of Series C notes March 1 at par and interest, totaling \$4,556,668.

Salesmen Headed List of Paige-Jewett Buyers

DETROIT, Feb. 13—Salesmen, as a class, were the largest purchasers of Paige-Jewett cars in January, according to the monthly report of the sales analysis department at the factory. Next to these came mechanics, merchants third, executives fourth, farmers fifth and women, sixth. Classes and percentage of total business are as follows:

Salesmen	9.4	Retired	2.7
Mechanics	8.7	Hotels, Restaurants	2.5
Merchants	7.8	Political	2.3
Executives	7.0	Railroad Men	1.4
Farmers	6.3	Taxi, Livery	1.3
Women	5.9	Oil	1.2
Real Estate	5.5	Grocers, Meats	1.1
Physicians	5.1	Teachers	1.1
Building Trades	4.7	Lawyers	1.0
Garage Men	3.9	Drugs9
Clerks	3.5	Miscellaneous	3.9
Engineers	3.3	Not Given	6.4
Bankers, Brokers	3.1		

Campaign Launched for Repeal of Taxes

Calls Made on Members Are Being Supplemented with Arguments by Mail

(Continued from page 356)

or some allied organization, presenting the argument of the automobile user or manufacturer against the taxes. One of these includes a folder of the N. A. D. A., which was sent not only to members of Congress but to the 1000 members of the organization and to approximately 40,000 automobile dealers.

Each folder carries with it an appeal to the dealer as follows: "Your turn is now. How long, Mr. Automobile Dealer, are you willing to see the industry in which you make your bread and butter unjustly imposed upon? Make your demand now on the Ways and Means Committee and to each member of the House and particularly your own congressman for a complete repeal of the war tax on automobiles, parts and accessories, etc."

Map Sent Congressmen

Other displays sent members of Congress include a map showing the number of automobiles in his State, with a veiled suggestion that this number of voters are interested, a display showing how the farmer uses an automobile, a cartoon showing the amount of taxes paid and a series of photographs showing the uses of automobiles and trucks.

In commenting on the fight made for the repeal, Mr. Reeves says:

And we have just begun. Present indications are that the section of the repeal of the automobile excise taxes will be reached now in about two weeks. Every day between now and then each Congressman will receive a piece of literature telling our story of what is actually a discrimination against millions of people in the United States—automobile and trucks users.

We shall not stop there either. It's a fight to the last day when the final vote is taken and our representatives, not only of my own organization, but of allied organizations, will make as many personal calls each day as possible in an effort to show as many members of Congress as we can of the justness of our fight.

Figure Industry "Easy Money"

After talking with a great many Congressmen, the whole thing in their mind, as revealed to me is that we, and by that I mean the automobile industry are: "Easy money," so far as the collection of taxes is concerned. The members that I have talked to have not, many of them, even tried to advance an argument against the repeal of some of these taxes. They simply declare that it is an easy way to collect the necessary revenue and the sum is too big to cut out of the tax schedule.

Our big fight, as I see it at this time, is to get some sort of actual reorganization. If this thing goes on too long Congress will come to believe in the justness of the excise taxes on automobiles, just as it does on tobacco today, with the result that the mil-

TAX REPEAL ACTION IS URGED ON TRADE

WASHINGTON, Feb. 9.—The National Automobile Dealers Association has sent the following telegram to its distributor members:

"Interviews here today with prominent senators and congressmen indicate a strong possibility of some reduction in excise taxes, especially parts and tires, which is regarded as a 'misfortune tax,' provided dealers and owners indicate to their congressmen and senators that they desire such reduction.

"The present plan of Congress provides for the removal of \$114,000,000 war excise taxes on such articles as bowie knives, billiard tables, jewelry, candy and twenty-two other items, but without provision for relieving trucks, cars or parts.

"Our association feels that every dealer should himself wire his congressmen and senator and ask his customers to do likewise to insure their knowing our attitude on these discriminatory imposts.

"Will you help by duplicating this in a letter to your dealers? Prompt action is necessary as the whole matter will be settled within two weeks. The National Automobile Chamber of Commerce and six other associations are cooperating."

lions of car users will pay millions upon millions into the Federal fund, that is unjust and discriminatory.

In summing up the outlook for some success in the fight, Mr. Reeves expressed as his belief that Congress would offer some relief on truck and repair parts excise taxes. Little hope is entertained by those conversant with the fight that there will be any measure of relief on passenger car taxes.

In a letter to members of the Ways and Means Committee and to each member of Congress, the American Automobile Association, under the signature of Thomas P. Henry, president, makes the caustic reference that the Ways and Means Committee "has slammed the door in the American motorist's face, and we believe that you are not doing the fair or the equitable thing." Its letter says in part:

It would appear to us that the majority members of your committee have slammed the door in the faces of the 15,000,000 motorists of this country. You sanction the removal of practically every war excise tax except those Federal taxes connected with the automobile, and to the users of these you say in effect, "We will not recommend the elimination or the reduction of either—1. The 5 per cent war tax on repair parts. 2. The 5 per cent war tax on accessories. 3. The 5 per cent war tax on tires. 4. The 3 per cent war tax on trucks. 5. The 5 per cent war tax on new automobiles."

You recommend the removal of all Federal taxes on transportation and communication except those on individual motor transportation.

Citroen's Engineers Will Buy Machinery

Earlier Order Placed in United States Will Be Duplicated by Visitors

NEW YORK, Feb. 14.—André Citroen is so well satisfied with the huge investment made in American tools and machinery during his visit to this country last year that he has commissioned E. R. Frederick, one of his fifteen engineers now visiting various automobile plants in this country, to buy an additional amount, the bill for which is expected to run well over \$1,000,000.

The representatives of the French automobile manufacturers are expected to be in Detroit Friday, making their headquarters at the Statler, for a stay of a week or ten days.

At the head of the delegation is G. M. Haardt, director general of the Citroen company, who handled the mechanical details of the famous Citroen trip across the Sahara Desert, the first time this great feat was accomplished. With him are Raymond Smoliak, Hector Mondragon, Claude Coulon, Jules Salomon, Raymond Stern, Paul Tranchat, Henri Guillon, Rene Vincent, Marcel Collete, Paul Vavon, Paul Folliot, E. R. Frederick and Jean Aube.

This delegation has been split into three groups, one of which is studying body building, another routing of material through the factory and a third the designing of engines and finished parts.

M. Haardt was today advised that a forty-eight hour strike involving 7000 workers had just been settled in the Citroen plant in France. The strike was caused by the workers objecting to Citroen's adoption of American methods in his plants. M. Citroen succeeded in convincing his men of the wisdom of this radical departure which has been in force since last summer. Through its use, he told them, he has been able to increase his daily production from sixty to 100 cars.

February Promising New Output Records

(Continued from page 356)

year's operations. The outlook for an active spring selling season is unquestionably good. In February of 1923 trucks built aggregated 22,161, as against 19,720 in the month previous. It is estimated that in January this year 34,000 trucks were produced.

Production is holding firm on bus chassis built by truck manufacturers, with no lightening in sight. The growth in popularity of the motorbus as a means of conveyance will continue to be reflected in the improved conditions in the truck industry.

Amalgamated Motors Acquires Northway

**Takes It Over Formally as One of
Last Steps in Truck and
Car Merger**

PLAINFIELD, N. J., Feb. 11—The Amalgamated Motors Corp. has formally taken over the Northway Motors Corp. and its affiliated companies, the trustees who have been in charge of the properties for two years retiring and the Amalgamated's nominees, Proctor W. Hansl and Robert Bursner, being elected president and treasurer respectively.

This is one of the last steps in the big merger which brings into one family the Bessemer, Winther, Krebs and Northway trucks and the American passenger car. It is announced that there will be no change in corporate entities nor will assets be affected in any way by the consolidation; but the activities of all properties will be consolidated under central control, and the constituent companies will have the benefit of additional financing to the extent of individual requirements.

Current models will be continued with some changes, and a light delivery truck will be put into production at one of the plants, probably Northway, for distribution through all dealer organizations represented in the combination. This new model will be priced around \$1,000 and powered with a light six-cylinder engine.

C. W. Blackman has assumed charge of manufacturing operations at all plants.

Bossert Corp. Develops High Carbon Steel Drum

UTICA, N. Y., Feb. 11—The Bossert Corp. has experimented for a considerable time on the drawing of brake drums from high carbon steel, and as a result has developed a drum of 0.40-0.50 per cent carbon steel which is now being made in sizes suitable for trucks and buses. It is expected that delivery of passenger car sizes will begin in the near future.

High carbon steel drums have the advantage over those of low carbon steel that their working surface roughens up less in service and the brake linings, therefore, wear less. Besides, the high carbon steel is stiffer, and the drum, if made of the same gage of material, will deform less under the pressure of the brake shoes. A large manufacturer of taxicabs is said to be planning to equip all future cabs with high carbon steel drums.

Recent additions to the electric and acetylene welding plants will enable the Bossert Corp. within a month to increase their axle housing capacity to 2000 per day.

WASHINGTON STEAM CAR

MIDDLETOWN, OHIO, Feb. 11—The Washington Motor Co., formerly of

Eaton, Ohio, but now located here, is engaged in the development of a steam car of medium size, which it expects to put on the market during the coming summer. A semi-flush water tube type of boiler is used in connection with a four-cylinder single-acting engine. The car will list under \$2,000, according to present plans. A. H. Christman is president of the company; E. C. Wysong, vice-president; John Voge, secretary, and O. M. Shipley, manager and treasurer.

Topp-Stewart Tractor to Resume Operations

MILWAUKEE, Feb. 11—Improvement in the tractor business in recent months, together with much brighter market possibilities observable in the foreground, have induced the directors of the Topp-Stewart Tractor Co. of Clintonville, Wis., to order a reinstatement of production, which was intermitted about two years ago owing to the general depression in the tractor business.

A committee on reorganization was appointed, with power to reopen the plant at once and contract for materials and labor for a regular production. This, of course, will be on a scale considerably less than capacity for the time being, but the expectancy is that by the end of 1924 demand will be such that the works will be able to operate at full force.

The Topp-Stewart is a tractor embodying a quadruple drive and is designed for heavy duty in agriculture, logging and general industrial purposes. It is in the last-named field that the best prospects are seen, although farm demands are said to be improving and loggers are steadily replacing horse-drawn and steam hauling equipment with gasoline, kerosene and oil tractors because of the flexibility and manifold purposes obtainable therefrom in addition to simple hauling.

Ford Closed Car Trade on Increase in Canada

DETROIT, Feb. 11—Trend of the closed car market in Canada and the provinces to which Ford Motor Co. of Canada ships is shown in the increased from a 16 per cent total in 1919 to 38 per cent in 1923. Introduction of the new closed models of the company, which are similar to the closed models made by the Ford company in the United States, is resulting in still larger increases in closed car orders, the company reports.

Retail business in Canada in 1923 was sub-divided as follows: Open cars, 54 per cent; closed cars, 35 per cent; trucks, 11 per cent. More than 40,000 trucks have been produced by the Canadian company since the first was built in 1917.

FORD CHICAGO PLANT OPENED

CHICAGO, Feb. 13—The new branch of the Ford Motor Co. on the Calumet River has been formally opened. The plant will employ 2500 men and will have an eight-hour capacity of 600 automobiles. Its location makes it easily accessible both by rail and water.

G. M. Profit Per Unit Estimated Under \$75

**Financial Paper Draws Conclusions from Preliminary Report
of 1923 Earnings**

NEW YORK, Feb. 11—Commenting on preliminary report of General Motors, which shows that, despite a phenomenal year in 1923, the margin of profit per dollar of sales, which in 1922 exceeded 11 per cent, declined last year to about 8½ per cent, *Financial America* says that "this reduction in profit margin clearly reflects the cuts which have been made in selling prices of finished cars and the cost of additions and improvements which have been made at the same time."

"The General Motors showing for 1923, when compared with previous years, appears to offer conclusive evidence that at present the motor vehicle purchaser is evidently getting a greater value for his dollar than ever before."

Continuing, *Financial America* says:

The intensity of the competition in the automotive industry is also reflected in the General Motors showing for 1923 which shows that the 75 per cent gain in unit volume of output was not sufficient to offset the effects of lower selling prices and higher manufacturing costs. Since a substantial portion of General Motors Corp.'s profits are derived from the sale of products other than cars and trucks it is not possible to determine from available figures the company's exact profit per vehicle unit.

For the purpose of comparison, however, it is interesting to note that including income from the sale of other products the average profit on the 796,000 cars and trucks sold last year was about \$78, while in 1922 the average was \$112 per vehicle unit. Allowing for the earnings derived from other products, it is apparent that last year General Motors realized a profit of less than \$75 per car or truck.

Close-Tite Liquidates \$116,000 Indebtedness

FOND DU LAC, WIS., Feb. 11—Reports of officers to stockholders at the annual meeting of the Close-Tite Manufacturing Co., manufacturer of all-weather bodies for Ford phaetons and roadsters, show that in two years' time an indebtedness of \$116,000 has been fully liquidated and in addition a surplus has been created.

The past year was an especially profitable one, and prospects for 1924 are regarded as even better. A new factory was built three years ago at heavy cost. Officers were re-elected as follows: President, A. P. Baker; vice-president, S. H. Longdin, and secretary and treasurer, Carl H. Brugger.

FREE ENTRY LAW REPEALED

WASHINGTON, Feb. 11—Repeal is announced of the British law permitting the free entry of British-made motor vehicles into British Guiana.

Warehousemen Draft Transportation Bill

It Provides That Carriers Be Supervised by Public Utilities Commissions

CHICAGO, Feb. 13—What it terms a model bill for regulation of motor highway transport is under consideration by the executive committee of the National Furniture Warehousemen's Association, which has its national headquarters here. The measure was presented at the semi-annual convention of the association in Houston, Tex., recently by a special committee which had spent months of inquiry in cooperation with national electric railway association interests.

If the directors of the warehousemen's organization approve of tentative plans outlined at the Houston meeting, the bill will be presented to the Uniform State Laws Commission with a recommendation that it be placed before the Legislatures of the various States with a view to having it enacted as a uniform statute.

Purpose of Legislation

Specifically the purpose of the bill is:—"To provide for the supervision and regulation of the transportation of persons and property for compensation over public highways in motor propelled vehicles, defining motor transportation companies and providing for the enforcement of the provisions of this Act and for the punishment of violators thereof."

Under this measure freight and passenger motor carriers would be placed under the supervision of State Public Utilities Commissions.

In the opinion of the backers of the proposed bill, the public storage industry is confronted with Interstate Commerce Commission regulation of motor highway transport, and one purpose of the bill is to give this industry "proper definition" preferably under a uniform State law which would recognize that the industry gives "specialized service." The industry has no disposition, it is stated, to avoid its fair share of highway taxes, but in return desires protection.

Zone Bodies Working on Plans

The association's special committee is organized on the basis of six zones covering the country, and these regional zone bodies are at work on a plan which will be presented at the summer convention, for organizing regional long-distance moving companies which would compete with the railroads. This plan, the sponsors maintain, would assure uniform methods for the warehousemen and uniformity of rates for the public, and would lead toward earlier enactment of the proposed uniform bill.

Under this bill each State Public Utilities Commission would be empowered to supervise and regulate motor transport companies; fix, alter and regulate rates; regulate the service and safety of vehicles; establish routes; require annual fil-

ing of reports and other data; provide uniform accounting systems; prescribe rules and regulations, and require operators to obtain certificates of public convenience and necessity, and to file tariffs and affidavits regarding routes to be operated; to pay taxes toward maintenance and repair of highways, and to be insured. The bill contains twenty-nine sections.

French Automobile Plants Not Making War Material

PARIS, Feb. 2 (by mail) — Reports actively circulated in England, to the effect that French automobile factories are being kept busy on war orders are entirely without foundation. There is not an automobile factory in France producing machine guns, rifles or munitions, for the French or any other government. Hotchkiss, which is both an automobile and a machine gun firm, has two entirely distinct factories, several miles apart, and is producing nothing but automobiles in the automobile factory.

Even such semi-war material as aviation engines is limited to a few specialists. Hispano-Suiza has more men employed at its Paris factory on aviation engines than on cars, but this firm's car output never has exceeded 350 cars in any one year. Renault, Lorraine-Dietrich, Farman and Talbot-Darracq have government aviation engines in hand, but the value of these orders is probably not more than 1 per cent of the firms' car output.

Argentine Import Duty Based on Exchange Rate

WASHINGTON, Feb. 11—Import duties in Argentina on automobiles are to be calculated in the future at the current rate of exchange, according to advices received by the automotive division of the Department of Commerce, from George S. Brady, trade commissioner at Buenos Aires. The new regulations became effective Feb. 2.

The duties will be collected on net factory price, plus freight and insurance. The dealer's discount must be included in the declared valuation. Up to the present time duties have been collected on the published list price at the normal value of the peso, which is the Argentine unit of currency. The rate of duty remains 25 per cent ad valorem.

Plant Capacity Pushed by Tri-City Malleable

EAST MOLINE, ILL., Feb. 13—The Tri-City Malleable Iron Casting Co., which last week received contracts for castings from several major car producers, has pushed its production to capacity and will continue at top speed for at least six months to handle the business, H. C. Smith, president, announces.

Working force has been increased from 165 to 250 men, and an output of 300 tons of castings monthly is scheduled by the company.

Railroad Works Out Plans for Truck Use

Pennsylvania Extends Service and Outlines Methods of Handling Freight

NEW YORK, Feb. 11—The Pennsylvania Railroad has worked out three plans for the use of motor trucks in handling less-than-carload freight. They are as follows:

1—Elimination of package local or peddler train, motor trucks serving intermediate stations between zone stations, zone stations being served by "destination cars."

2—Establishment in large cities of break-bulk points away from congested terminals and transfer of freight by motor truck from such break-bulk points to city stations inbound and outbound, doing away with trap car service.

3—Door-to-door pick-up and delivery to and from break-bulk points, or store-door delivery.

Store-door delivery of less-than-carload freight is the ultimate objective of this railroad, which last week put into operation four more motor truck units, making a total of eleven units and twenty trucks in regular operation, displacing eleven local less-than-carload freight trains.

Truck Service Augmented

This action follows the inauguration of motor truck service on Feb. 4 on the Atlantic Division, between Gloucester and Newfield and between Wilmington and Perryville on the Maryland Division. The new fleet will operate between Arch Street, Palmyra and Bordentown and between South Amboy and Bordentown, both on the Trenton Division.

This gives the Pennsylvania 602 miles of daily truck operation, which soon will be increased to 1000. The first unit was established in January, 1923, from Cambridge to Salisbury, in connection with the B. C. & A. and the P. R. R.; also Easton, Goldsboro, Denton and Federalburg.

On July 9 the next was added between Pittsburgh and Enon on the Eastern Division; then came Overbrook to Downingtown, Philadelphia Division, Nov. 13; Paschall to Wilmington, Maryland Division, Nov. 19; New Alexandria Branch, Pittsburgh Division, Nov. 26, and the Monongahela Division, between Pittsburgh and Monongahela City, Jan. 2, 1924.

CRUDE RUBBER CURTAILMENT

NEW YORK, Feb. 11—Cable advices from London state that crude rubber output is to be further curtailed. New rules have been announced carrying into effect the Stevenson restriction committee's recommendations providing for reassessment of standard production from Nov. 1, 1923. Pending re-assessments, credits or coupons are to be issued.

Men of the Industry and What They Are Doing

Harry Meixell Resigns

Harry Meixell, secretary of the Motor Vehicle Conference Committee, in which are affiliated the N. A. C. C., M. A. M. A., A. A. A., S. A. E. and several other bodies, and also secretary of the Legislative Committee of the N. A. C. C., has resigned to become general manager of the Mortgage & Title Guaranty Co. of New Jersey, with headquarters in Newark. Mr. Meixell is succeeded as secretary of the Motor Vehicle Conference Committee by Russell Huffman, a Columbia graduate, who has been associated with him in his automobile legislative work for some time.

Hallinger Heads Truck Body

W. N. Hallinger has been appointed manager of Motor Truck Industries, Inc., to succeed Don F. Whittaker, who resigned recently to become a zone sales manager in the Haynes organization.

George W. Kerr Joins Reo

George W. Kerr has joined the engineering staff of the Reo Motor Car Co. as body engineer. Mr. Kerr was identified with Reo from 1915 to 1918, removing to Racine, Wis., to assume charge of a large plant making war material for the Government. He later became works manager of the H. & M. Body Corp. of Racine, and in 1922 to 1923 was in charge of the coach works of the Rolls-Royce Co. of America, at Springfield, Mass. Mr. Kerr dates back in the industry to 1903, when he established the body department of the Knox Automobile Co. at Springfield, where he remained for six years. Following this he developed a line of bodies for the Stevens-Duryea company at Chicopee Falls, remaining there six years.

Simpson Succeeds Tobin

T. M. Simpson has succeeded B. F. Tobin, Jr., as secretary of the Continental Motors Corp., and W. C. Keith has been made assistant secretary, to succeed Mr. Simpson.

Garford Truck Appoints Kincaid

R. M. Kincaid has resigned as works manager of the U. S. Light & Heat Corp. of Niagara Falls, N. Y., J. K. Gould taking over that part of his work having to do with the manufacture of batteries, and Otto Von Goeben carrying on the device and arc welder end of the business. Mr. Kincaid resigned to join the forces of the Garford Motor Truck Co. of Lima, Ohio.

Visiting Cadillac Distributors

Joseph A. Schulte, who was for seventeen years manager of the Cadillac Detroit branch and is now a partner of the Buffalo-Cadillac Corp., with Jay W. Dunivan, Cadillac manager of distribu-

TOLEDO TO ENTERTAIN CONGRESS DELEGATES

TOLEDO, Feb. 11—Toledo will be host to about 300 foreign guests interested in the automobile industry on May 26.

This big group of men from all countries of the world will come from Detroit and the World Motor Transport Congress to be entertained at luncheon by John N. Willys, president of the Willys-Overland Co., and during the day will be taken on a trip about the city.

Monday following the closing of the congress at Detroit will be the big day for Toledo. The guests will be brought from Detroit by automobile.

tion, are on tour of Cadillac's western territory, visiting distributors at Denver, Colorado Springs, Boise, Spokane, Portland, Seattle and San Francisco. Returning they will visit distributors at San Antonio, Tex., and New Orleans.

Thomson in New Connection

Henry L. Thomson, sales manager of the tractor division of the Moline Plow Co., has resigned and has become identified in a similar capacity with the Neway Motor Co. of Lansing, Mich. Mr. Thomson went to Moline seven years ago to join the tractor department of the Moline Plow from the agricultural engineering department of the Stillwater (Okla.) Agricultural College.

Lansing Chamber Elects Carlton

Clarence Carlton, secretary of the Motor Wheel Corp., was elected president of the manufacturers' and jobbers' division of the Lansing Chamber of Commerce this week, succeeding H. D. Luce of the High Lyons Co. J. P. Hopkins of the Atlas Drop Forge Co. was named vice-president.

Dover Stamping Promotes Cleaver

Louis S. Cleaver has been promoted to the position of sales manager of the Dover Stamping & Manufacturing Co. of Cambridge, Mass., succeeding Stanley C. Dunning.

REO LABOR TURNOVER SMALL

LANSING, MICH., Feb. 14—The Reo Motor Car Co. reports a labor turnover during the past year of less than 3.7 per cent a month. This is not the lowest record that the company has made in this particular, but officials consider it especially good in a year in which work was plentiful and in which there was a tendency among workmen to change employment frequently.

A. A. A. and N. M. A. To Be Consolidated

Two National Associations of Motorists Adjust Differences to This End

WASHINGTON, Feb. 14—The American Automobile Association and the National Motorists Association, at loggerheads since May, 1922, when Ohio, Indiana, a portion of Illinois and several other States bolted the annual meeting of the A. A. A. and formed the N. M. A., will be consolidated into one giant national association, in which past differences will be forgotten and every one will work for the general good of the cause.

Preliminary meetings with this end in view already have been held, and it is expected that at another meeting, to be held here Sunday, Feb. 24, the merger will be completed and details of the peace pact announced. Sessions held here last Saturday and Monday paved the way for the reconciliation, and an adjournment was taken to smooth out a few rough spots in the general scheme.

Thomas P. Henry, president of the A. A. A., and Fred H. Caley, secretary of the N. M. A., have been most prominent in bringing about this peace between the clubs of the country, both realizing that through such a merger the car owners would be able to present a united front in fighting for the rights of the users, particularly in the present effort to knock out the excise taxes.

A. A. A. Name to Be Kept

In all probability, it is thought, the name of the American Automobile Association will be retained because that organization has been in existence twenty-two years and is known the world over. It also is likely that Mr. Henry will be chosen as president of the amalgamated associations, with President Walter Meals of the N. M. A., given high office. Mr. Caley undoubtedly will figure high in the councils of the big body, while leaders on both sides will be enrolled in responsible positions.

It is felt that peace may be declared without injury to any one. Both associations have carried on effective work for the last two years, but the merger will bring together powerful factions that can do immeasurable good for the car owners' cause.

KLINGENSMITH REELECTED

DETROIT, Feb. 14—Frank Klingensmith was reelected president of Gray Motors at the annual meeting. Harry Burritt has been made general manager as well as retaining his post as secretary and treasurer.

Would Impound Cars of Reckless Drivers

N. A. C. C. Committee Feels That
Is One Way to Promote
Safety on Highways

ANN ARBOR, MICH., Feb. 14—Impounding of cars involved in accidents on the highways where reckless driving has been proved is advocated by the Traffic and Safety Planning Committee of the National Automobile Chamber of Commerce as one of the methods that will aid in making highways safe and reducing the number of accidents. The committee is framing a model law that will legalize such action and it is hoped that it will prove a most effectual weapon in controlling reckless driving.

This most radical plan was announced for the first time today in an address delivered at the tenth annual conference of Highway Engineers at the University of Michigan by George M. Graham, chairman of the committee. As outlined by Mr. Graham, it would be possible to impound a car, after the passage of the necessary law, either in the garage of the owner with police seals attached or in a public garage and with police seals affixed.

"The car whose driver recklessly or drunkenly puts human life in jeopardy has no right on street or highway," Mr. Graham said. "Take it away from him. Let the punishment follow the car as well as the driver. The automobile industry recommends this penalty in addition to all others now applicable where the offense has been proved after due process of law."

Graham Outlines Plan

Continuing in an outline of the new plan, Mr. Graham said:

We believe that fines have but small efficacy as a punishment for reckless driving. The suspension and revocation of licenses are much more effective. Jail sentences are better still. Finally, the use of the highways should be granted only to those who use a car wisely and fairly.

Our plan calls for the impounding of cars, where, after due process of law, the offense of reckless driving has been proved. We believe that the minimum should be at least sixty days, and that the period of impounding should be extended according to the seriousness of the offense.

We believe that our suggestion of impounding is feasible. It will reach many minor offenses for which juries now hesitate to impose jail sentences. We have not taken this step without carefully checking the legal side, and we believe that even under present law our suggestion is legal. If not, we shall recommend the enactment by all the legislatures of laws which will make our impounding plan possible. We are having prepared a specimen law which will be distributed among those who desire to know what would be a proper enactment drawn with regard to constitutional limitations and practical effectiveness.

Our plan does not comprise the establishment of municipal pounds. This would mean expense. It might lead to graft. It might

raise questions of liability in respect to the condition in which the impounded car should be returned to its owner. Therefore we suggest one of two things—the car could be impounded in the garage of the owner with police seals attached, or in a public garage at the owner's expense, with police tags affixed. In either case the car could not be returned to service until the police had removed the seals.

We believe that many an offender who scorns a fine would be chastened by the temporary loss of his car.

Thomas P. Henry, president of the American Automobile Association, was another speaker, pointing out that the substitution of the motor truck and the highway for local package freight trains by two of the prominent railroad systems in certain instances are among the recent highway transport developments which emphasize the importance of the work of the highway engineer.

Mr. Henry declares that motorists want at this time the adoption by Congress of a three year Federal aid program of \$100,000,000 annually, beginning in 1925; an additional \$10,000,000 a year for the next three years for road building in the national forests, the allocation to the Territory of Hawaii of its share of Federal aid and further relief to the Western States for the construction of roads through the national parks.

Olds Price Increases Range from \$30 to \$45

DETROIT, Feb. 11—Revised prices on Oldsmobile models effective today result in increases ranging from \$30 to \$45. Models are now priced as follows:

	Old Price	New Price
Roadster	\$750	\$795
Phaeton	750	795
Sport Phaeton.....	885	915
2 Pass. Coupe.....	955	985
4 Pass. Coupe.....	1,035	1,075
Sedan	1,095	1,135

The increases are understood to be due to increased material cost.

Stewart Advances Prices \$100 on All Its Trucks

BUFFALO, N. Y., Feb. 13—The Stewart Motor Corp., manufacturing the Stewart truck, announces an increase of \$100 in the list price of all its models.

The old and new prices are as follows:

	Old Price	New Price
Model 16.....	\$1,095	\$1,195
Model 15X.....	1,495	1,595
Model 9.....	1,870	1,970
Model 7X.....	2,590	2,690
Long Wheelbase.....	2,630	2,730
Model 10X.....	3,440	3,540
Long Wheelbase.....	3,490	3,590

FRED M. ZEDER IN HOSPITAL

DETROIT, Feb. 11—Fred M. Zeder, widely known engineer whose most recent work was in connection with the development of the Chrysler car, has been undergoing treatment at the Ford Hospital for digestive disorder and is reported nearing the point when he will leave the hospital fully recovered.

Michelin Price Rise in Europe Reported

At Same Time, Dunlop Is Said to
Have Decreased Some Lists
in England

NEW YORK, Feb. 9—Cable reports to the export offices of some of the tire companies here indicate that important increases in price have just been made by the Michelin company in several European countries. Although complete information was lacking, it was understood that the increases were general throughout the Michelin line and on some sizes ranged as high as 20 per cent. The countries mentioned specifically were France, Belgium, Spain and some parts of Northern Europe.

Another development just reported was that the Dunlop organization had suddenly made certain decreases on its lines in England. These were said to have been unexpected, but perhaps were for the purpose of meeting competition, as the change was only on certain sizes.

Export officials were of the opinion that the Michelin increases were of much significance, as the recent depreciation of the franc had given this company an unusual opportunity for extending its sales in many countries. Recently, however, the franc has risen in value, and the apparent success with which the Dawes commission is meeting the reparation problem gave rise to the belief that the franc would either become stabilized or appreciate further.

In this event the advantage which Michelin held would be wiped out, and prices in the export tire field would be cleared up. Another subject of conjecture was how this condition would develop in regard to exports from the Michelin plant in Italy.

Three Oakland Models Show Advanced Prices

DETROIT, Feb. 14—Effective Feb. 18, the Oakland Motor Car Co. announces that the prices of the standard roadster and phaeton models will be increased \$50 while the four-passenger coupe will be increased \$100.

Prices of the sport roadster and phaeton, business coupe and sedan will remain unchanged. The following table gives the old and new prices:

	Old Price	New Price
Roadster	\$ 945	\$ 995
Phaeton	945	995
Sport Roadster.....	1,095	1,095
Sport Phaeton.....	1,095	1,095
Business Coupe.....	1,195	1,195
4-Passenger Coupe.....	1,345	1,445
Sedan	1,395	1,395

DUPLEX TO MOVE MARCH 1

LANSING, Feb. 13—Duplex Truck Co. will move into its new and enlarged plant here March 1, where with improved manufacturing facilities, it will increase production materially.

More Casings Built and Shipped in 1923

Increase Over Previous Year Also
Shown with Inner Tubes
and Solid Tires

NEW YORK, Feb. 13—Statistics have been compiled by the Rubber Association of America for the Department of Commerce, showing the inventory, production and shipments of pneumatic casings, inner tubes and solid tires for the year 1923 as compared with 1922. They follow:

PNEUMATIC CASINGS

1922	No. Mfrs. Report- ing	Inven- tory	Produc- tion	Ship- ments
January	66	4,174,216	2,055,134	1,596,806
February	66	4,691,329	2,084,308	1,562,365
March	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,042,147	2,838,890	3,133,260
July	63	4,834,106	2,476,636	2,695,095
August	63	4,629,392	2,905,209	3,029,823
September	64	4,612,037	2,504,744	2,502,106
October	54	4,682,953	2,674,662	2,588,770
November	62	4,964,976	2,733,134	2,379,708
December	59	4,599,208	2,656,942	2,934,079
		30,698,139	29,221,899	

1923				
January	62	4,695,916	3,127,270	2,994,297
February	60	5,224,387	3,217,987	2,588,639
March	58	5,670,601	3,855,726	3,322,637
April	56	6,088,272	3,539,326	2,976,160
May	57	6,906,594	3,659,986	2,757,764
June	55	7,040,600	2,956,943	2,502,185
July	54	6,471,124	1,992,989	2,539,425
August	58	6,058,387	2,355,915	2,807,432
September	60	5,397,557	2,029,581	2,623,775
October	59	4,876,352	2,361,340	2,819,583
November	55	4,689,329	2,399,725	2,456,296
December	57	4,329,300	2,437,148	2,603,617
		33,933,936	32,991,810	

INNER TUBES

1922	No. Mfrs. Report- ing	Inven- tory	Produc- tion	Ship- ments
January	66	5,246,647	2,343,393	1,889,724
February	65	6,141,956	2,596,774	1,702,583
March	63	6,991,118	3,017,511	2,090,737
April	65	7,230,096	2,650,573	2,329,343
May	65	7,189,552	2,970,696	2,938,947
June	64	6,186,534	3,130,629	3,973,679
July	63	5,675,839	3,068,199	3,630,744
August	63	5,207,228	3,808,224	4,220,055
September	64	5,164,757	3,501,442	3,558,971
October	64	5,488,033	3,787,758	3,420,680
November	61	6,210,053	3,850,908	3,075,023
December	59	5,732,125	3,411,074	3,825,949
		38,137,181	36,656,435	

1923				
January	62	5,838,310	3,951,885	3,748,651
February	60	6,771,958	4,039,202	3,001,697
March	57	7,740,945	4,875,414	3,828,315
April	55	8,394,184	4,259,558	3,535,635
May	57	9,292,223	4,317,537	3,414,115
June	54	8,924,326	3,590,011	3,581,060
July	52	7,527,281	2,666,354	3,942,247
August	53	6,950,578	3,577,922	4,304,034
September	55	6,457,455	3,254,575	3,683,574
October	55	6,898,425	3,855,244	3,595,737
November	53	6,693,639	3,451,716	3,422,426
December	52	6,318,446	3,288,665	3,497,472
		45,128,083	43,554,963	

SOLID TIRES

1922	No. Mfrs. Report- ing	Inven- tory	Produc- tion	Ship- ments
January	11	181,769	40,224	33,294
February	11	183,448	39,492	36,805
March	11	182,197	49,433	48,350
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	169,808	66,089	63,408
July	11	176,375	71,505	60,425
August	11	189,698	84,313	69,435
September	11	200,016	82,767	66,797
October	11	213,942	85,480	71,275
November	11	234,684	85,775	61,466
December	10	244,061	77,221	64,570
			786,603	688,845

1923				
January	11	262,462	83,343	60,611
February	11	270,191	75,457	63,394

March	11	265,843	79,788	77,144
April	10	260,631	71,468	72,609
May	10	268,323	77,288	67,147
June	10	283,425	72,445	52,126
July	10	263,891	42,345	45,219
August	10	262,810	48,141	45,925
September	10	249,379	37,074	45,971
October	10	234,945	37,285	48,065
November	11	213,686	32,577	49,471
December	10	178,088	34,937	62,408
		692,148	690,090	

"Production" and "Shipment" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipment" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

200 Chevrolets Daily Built in Cincinnati

CINCINNATI, Feb. 9—The Chevrolet Motor Ohio Co., operating an assembly plant for the Chevrolet in this city, has increased its production until today the average is in excess of 200 daily.

The factory building of the company is divided into two main wings, one for the production of finished automobiles, and the other for the production of closed bodies. The latter is directly controlled by the Fisher Body Corp. Some time this month closed bodies will be built in the new plant, starting with about fifty daily and working into its present maximum of about 100 by March 1.

The Ohio company employs about 1100 when working on maximum production and Fisher Body is employing between 400 and 500 men.

Capital Stock Changes Planned by C. G. Spring

KALAMAZOO, MICH., Feb. 11—A special meeting of the common stockholders of the C. G. Spring Co. will be held here Feb. 14 to vote on the following projects:

(1) To change certificate of incorporation with regard to preferred stock to read 100,000 shares of \$10 par value, in place of 10,000 shares of \$100 par value and to make such detailed alterations to the certificate as are required by such change.

(2) To change certificate of incorporation with regard to common stock to read 150,000 shares in place of 15,000 shares. Following this change the board will immediately authorize the issuance of ten shares for each share now outstanding.

(3) To change certificate of incorporation with regard to the name of the company to read "The C. G. Spring & Bumper Co." in place of the C. G. Spring Co.

The Security Trust Co. has taken over the work of transferring and registering certificates and will arrange the calling in of old certificates and issuing of new, if the three alterations suggested are made effective.

The company recently completed a highly successful campaign of additional financing, thereby increasing its available working capital to the extent of \$550,000. The stock issue was largely over-subscribed.

Racine, Wis., Eager to Get Hupp Branch

Interest That Was Shown in
Mitchell Sale Results in
Launching of Campaign

RACINE, WIS., Feb. 11—Strenuous efforts to convert the interest of the Hupp Motor Car Co., manifested by its bid for the bankrupt Mitchell plant, into the establishment of a branch Hupp plant in Racine, are being made by the Racine Association of Commerce. When the Mitchell real estate and buildings were auctioned recently, Hupp made a bid of \$400,000, which was topped by \$5,000 by Nash. Hupp declined to go higher and lost the property.

Having this evidence that Hupp was interested in establishing a Racine plant close to its principal source of body supplies in Racine, a campaign was launched immediately to induce the Detroit concern to locate here.

A prominent realtor came forth with an offer to present the Hupp company with a 45-acre tract, valued at \$90,000, on the Chicago, Milwaukee & St. Paul main line, on condition that an investment of \$400,000 be made in buildings and equipment. In addition, local capital offers a cash bonus as well as making a substantial investment in the proposed plant. The offers have been taken under consideration.

Racine suffered severely when the Mitchell plant was closed by bankruptcy proceedings, and there is great elation over the acquisition of the plant by the Nash interests, which is taken to mean the employment of at least 3000 workmen made largely idle by the failure, and the possibility of the need of 2000 to 3000 more men by Nash when the Mitchell plant goes back into production.

In consequence of developments, enthusiasm over a new plant by Hupp is keen and strong financial backing has been relatively eager to come forth.

License Law in Indiana Is Held to Be Invalid

INDIANAPOLIS, Feb. 13—The Supreme Court of Indiana has handed down its decision holding invalid the motor vehicle license bill, passed in 1923 and effective Jan. 1, 1924. The old fees will be in force, and the State highway department will be deprived of revenues estimated at more than \$2,000,000 for the balance of the year.

This will cut the highway pavement plan from 400 miles to not much more than 250 and will leave the State with an unmatched balance of Federal aid in 1925 of at least \$4,000,000.

Passenger cars of less than 25 hp. will now pay but \$5. Those of more than 25 and less than 40 hp. will pay \$8.

The law was declared invalid because of technical errors in drawing.

South Africa Likes Steam Driven Truck

Gasoline Vehicles in Excess of Five Tons Reported to Be Losing Ground

JOHANNESBURG, SOUTH AFRICA, Jan. 14 (*by mail*)—The prospects for 1924 are bright and dealers look forward to a steady demand for cars of the low and medium priced class. Customs figures indicate that the total imports of cars and trucks into the Union of South Africa for 1923 will be about 10,000—a figure far beyond the dreams of the most sanguine. It is estimated that approximately 8000 cars a year are now necessary for replacement, so that the 10,000 mark may be exceeded in 1924.

British Ought to Get Business

The British manufacturers are out to obtain a big share of the colonial trade, and American manufacturers, although they have a long start, will have to reckon with this in 1924. Austin cars are now very suitable to road conditions here and sell at a price that is competitive.

The Rover people are also after the business, and Fiat is placing cars on the market in increasing numbers. The very small cars are not gaining in popularity in this country, as fairly high horsepower is necessary. The latest car arrival is the 1924 Oakland, and it has been accepted by the public as another instance of remarkably good value for money.

The police authorities are thinking about holding an official test for brakes in Johannesburg, as it is known that a very large number of motorists are careless in this respect. Defective brakes seem to be looked upon as nothing serious. The regulations regarding the test for the driver's license are also tightened up and it will be necessary to know more about driving and the car to become a motorist in 1924.

License holders, similar to those in use in Great Britain, will have to be carried by all motorists and motorcyclists. In these holders will be the official registration card giving the name of the owner and details regarding the car. The color of this card will be changed yearly.

Spotlight Use Limited

Other traffic laws are coming into force. The use of spotlights is being prohibited in most of the city and town areas in the Transvaal, and other provinces are following suit. The spotlight may be carried on the car, for it is recognized that on country roads it is helpful to driving, but its use in the more populated areas is strictly forbidden under heavy penalty.

It is thought that the tractor may start to take its rightful place in South Africa during 1924. The farmer, how-

ever, has had many bitter experiences with tractors and is not likely to try again unless he is assured of adequate means of service. There are a number of tractors now on the farms in this country, but many of them are not being used. The steam truck and tractor is gaining in popularity. For vehicles of more than five-ton capacity, steam has proved popular in this country.

A Super Sentinel 10-ton steam wagon recently traveled from Durban to Johannesburg, a distance greater than 400 miles over really bad roads, at an average speed of about 12 m.p.h. The municipalities and provincial councils are partial to steam for heavy freight work, and the gasoline truck is losing ground in this field.

Of course, gasoline trucks of from 1 to 3 or 4 tons' capacity will hold their own. Great developments in the bus field are looked for in the coming year, as most of the endeavors of the municipalities operating street car systems to stifle the movement have failed.

Nearly all the motor buses operating in Johannesburg and the Transvaal are of American make, while those in Cape Town and the Cape Province are mostly English and continental. There are more Reo buses in operation than any other make, and White, Republic, Leyland, Thornycroft, Guy and Clydesdale follow. Excellent and up-to-date bodies are now being built in Cape Town and Johannesburg.

Right Hand Rule of Road Adopted Throughout Italy

PARIS, Feb. 2 (*by mail*)—The right hand rule of the road has been adopted throughout Italy, taking the place of the old system under which vehicles generally kept to the right on the open road and to the left in cities and villages. Trolley cars which at present run on the left will have to be changed over to the right.

The war showed the impracticability of the dual system, and in all regions where the army had control, military orders were given requiring all vehicles to keep to the right.

Under the new law speed limits will be abolished on the open road, permission being granted to local authorities, however, to establish limits within townships.

If fines for infringements of road laws are paid on the spot, they will be reduced by half; if sent to the central authority the full amount will be exacted.

WRENCH MAKER REORGANIZES

MILWAUKEE, Feb. 13—The American Grinder Manufacturing Co., maker of Blackhawk wrenches, has effected a reorganization which will give the company greater working capital. The personnel of the company will remain practically the same, the only changes being the election of H. P. Brumder as president and E. G. Bott as secretary. Sales will continue under C. N. and F. W. Jonas of Chicago and Los Angeles.

S. A. E. Hears Talks on Engine Balance

Discussion Follows Presentation of Papers Before Detroit Section

DETROIT, Feb. 8—At a meeting of the Detroit section of the Society of Automotive Engineers, held here last night, L. C. Freeman of the Maxwell Motor Car Co. and J. E. Schipper of the Class Journal Company presented papers on the balance of automobile engines.

The paper by Mr. Freeman showed how the inherent unbalance of a four-cylinder motor can be counteracted by a proper design of the motor mounting. Mr. Schipper reviewed the question of balance of automobile engines from a critical standpoint and told of the influences affecting design, not only as regards the reciprocating and rotating masses in the engine, but also the influences involved in the manifolding, compression ratio, valve timing, etc.

Kreis Paper Due Later

O. C. Kreis of the Continental Motors, who was scheduled to discuss the fundamental causes of periodic vibration in crankshafts, with some new theories on the control of periods, will present his paper at a later date.

The meeting, which was attended by 200 Detroit section members, forms the first half of a two-meeting program devoted to the balancing of automobile engine parts. The program last night was intended to review the subject from the engineering standpoint, and that at the meeting to be held Feb. 21 will review the subject from a production standpoint.

A considerable part of the discussion was devoted to the possible effect of out-of-balance of rotating parts behind the engine, such as the universal joint, propeller shaft, etc. E. W. Seaholm, chief engineer of the Cadillac Motor Car Co., stated that since the new crankshaft has been used in its engine, resulting in greater engine smoothness, the Cadillac company is able to detect out-of-balance conditions in the propeller shaft very readily, and consequently has insisted on more careful balance of the propeller shaft members.

Remarks by Griswold

Walter Griswold, engineer in charge of analysis of design at the Packard Motor Car Co., spoke of some of the factors involved in the balancing of eight-in-line engines. He showed graphically the difference between balancing an eight-in-line by arranging it as two four-cylinder engines, end to end, or, as Packard does, by a four-cylinder engine in the center, with another four divided so that two cylinders are at each end.

He showed how the first method introduces a rocking couple, which, he said,

(Continued on page 369)

Says Implement Lists Are Kept Up Unfairly

Federal Trade Commission Com-
plains of Makers, Retailers
and Associations

WASHINGTON, Feb. 14—More than 500 farm equipment and machinery dealers, manufacturers and implement and vehicle associations have been charged with unfair practices by the Federal Trade Commission in their methods of retailing. The Commission charges that the "associations, manufacturers and dealers have conspired in keeping up the prices of farm equipment and machinery."

The Commission finds that the farmers' cooperative associations in the Atlantic seaboard States, who are the complainants, have had their source of supply cut off by the conspiracy between the associations of retail dealers in farm equipment and manufacturers of such equipment.

The manufacturers cited in the charge include the International Harvester Co. of Chicago; Emerson-Brantingham Co., Rockford; Moline Plow Co., Inc., Moline; Deere & Co., Moline, and Oliver Chilled Plow Works, South Bend, Ind. The retail dealers, it is alleged, operate through their several associations, which are named, viz: New England Implement Dealers Association, New York State Retail Implement & Vehicle Dealers' Association, Eastern Implement & Vehicle Dealers' Association, Virginia and North Carolina Implement, Machinery & Vehicle Dealers' Association and South Carolina Implement Dealers' Association. These several associations are themselves joined in a parent association, the Eastern Federation Farm Machinery Dealers.

The defendants have been given until March 12 to file their answer to the charges.

38,826 Cars Financed by Commercial Credit

NEW YORK, Feb. 11—The financial report of the Commercial Credit Corp. of New York and Montreal, which is affiliated with the Commercial Credit Co. of Baltimore, Commercial Acceptance Trust Co. of Chicago and the Commercial Credit Co., Inc., of New Orleans, shows assets of \$14,559,601 as of Dec. 31, 1923, in comparison with \$12,651,403 the preceding year.

The corporation financed at retail last year in the United States and Canada 38,826 cars with an approximate valuation of \$27,000,000. Of the \$8,733,396 retail time sales notes outstanding at the first of the year there was only \$69,774 over sixty days past due according to the original terms. In 1922 these retail time sales notes totaled \$6,813,252. Motor lien storage notes and acceptances figured at \$367,416 against \$872,812.

Repossessed cars in the corporation's

possession on the first of the year were valued at \$27,693, while those in dealers' hands were valued at \$58,467.

The affiliated companies, including those in Chicago, Baltimore and New Orleans, with combined resources of approximately \$64,000,000, financed during 1923, 179,226 motor vehicles at retail, with an approximate valuation of \$115,000,000.

FINANCIAL NOTES

Gardner Motor Co.'s balance sheet as of Dec. 31, 1923, shows resources of \$1,524,762 compared with \$1,808,323 at the end of 1922. Current assets reported include \$101,115 cash, \$874,522 materials and \$136,573 accounts receivable, with the plant valued at \$395,286. This compares with \$88,924 cash, \$1,036,020 materials and \$247,929 accounts receivable a year ago. In the way of liabilities capital stock is shown at \$1,354,000. Dealer's deposits are listed at \$25,894 as against \$35,444. Accrued liabilities amount to \$12,460. There are no commercial debts and the surplus is \$132,407. It is reported that on Dec. 31, 1923, the company was contingently liable on sight drafts, based on sales of cars in transit, in the amount of \$51,100 as against \$210,942 in 1922 and on a discounted note receivable for \$25,000 compared with the same amount in 1922.

Yellow Cab Manufacturing Co. reports for 1923 net income of \$4,005,365 after expenses and taxes, against \$3,038,926 in 1922. After allowing for dividends on the Class A stock a balance equal to \$6.50 a share on the 600,000 shares of Class B stock of \$10 a share the company reported earnings equal to \$14.95 a share on the 200,000 shares of Class B par value outstanding was reported. In 1922, stock outstanding in that year.

Hood Rubber Co. stockholders have been called to attend a special meeting Feb. 18 to authorize an increase of 16,000 shares of the 7 per cent preferred stock, the proceeds, \$1,600,000, to be devoted in part to plant additions and improvements. The present preferred shareholders will be offered the right to purchase the new stock in the ratio of one new share for each three shares now owned.

Detroit Motor Bus Co. stockholders have authorized a 100 per cent increase in capital stock to \$3,000,000.

Employment in Toledo Plants Still Mounting

TOLEDO, Feb. 13—All Toledo automotive plants have been going along the first six weeks of the year with employment mounting. At the close of January there were 25,142 men at work in the twenty-one largest plants, showing a net gain of 3758 workers over December and considerably greater than the same month a year ago which established the peak.

A report from fifty-one plants in the city showed a gain of 433 workers to a total of 27,098 at the end of the fourth week and another gain of 528 workers the succeeding week. There are now 27,624 men at work in the local industry covered by the report.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Another sharp upward movement in commodity prices and a general increase in activity were features of the business situation last week. Especially in iron and steel, textiles and clothing was improvement noted.

The production of pig iron in January amounted to 3,018,890 tons, comparing with 2,920,982 in December and 3,229,604 in January of last year. The average daily output, 97,384 tons, compares with 94,225 in December, and marks the first increase since last May. Reports indicate that the increase in steel production during the month was considerably greater than that in pig iron. Unfilled orders on the books of the U. S. Steel Corp. on Jan. 31 totaled 4,798,429 tons, the highest figure recorded since September, and 353,090 tons in excess of the December total.

Car loadings in the week ended Jan. 26 numbered 891,326, as compared with 895,276 in the preceding week and 869,464 a year ago. The latest figure is a new high record for the last week in January.

Production of crude petroleum in the week ended Feb. 2 averaged 1,917,600 barrels a day, as against a daily average of 1,894,900 in the preceding week. The increase was due mainly to the larger output in Oklahoma.

Fisher's index of wholesale commodity prices stood at 155.2 last week, comparing with 153.4 in the preceding week and 150 two weeks before. The rise during the fortnight amounted to almost 3½ per cent. Bradstreet's monthly index showed a slight recession in wholesale prices during January, standing at 13.1966 on Feb. 1 as against 13.2710 on Jan. 1.

Discounts by Federal Reserve banks declined \$35,000,000 during the week ended Feb. 6, the decline being about equally divided between bills secured by Government obligations and "other bills discounted." Bills bought in the open market, however, increased \$11,600,000 and Government securities gained \$3,900,000. Circulation of Federal Reserve notes declined \$5,100,000, total deposits \$37,500,000, and reserves \$4,000,000. The reserve ratio rose from 81.3 to 82.1 per cent.

Ypsilanti May Be Site for Ford Woolen Mill

DETROIT, Feb. 14—Approval of the sale of a municipally owned tract of land on the Huron River to the Ford Motor Co. was given by voters of Ypsilanti at a special election this week. It is commonly supposed that the property will be the site of a woolen mill and a hydro electric plant.

The Ford company indicates that the way is now open for it to proceed with the erection of a plant for a branch of its manufacturing but declares it too early to know just what this may be. The price paid for the property was \$30,000.

S. A. E. Hears Talks on Engine Balance

Discussion Follows Presentation of Papers Before Detroit Section

(Continued from page 367)

is entirely eliminated by the placing of a complete four in the center, with two cylinders of the other four at each end.

The subject of two flywheels was touched on to some extent. Many engineers present spoke of the torsional stresses which would be likely to be augmented by the use of a second flywheel. One member stated that it would be possible in extreme cases to run the torsional stresses up to such an extent that the shaft would fracture because of the second flywheel.

Speaking of the use of the vibration damper in place of the flywheel, it was stated that the vibration damper is used to cut down the height of the peak of forced vibration rather than to reduce the amplitude of vibrations which proceeded along the regular sine curve.

Joint Meeting in Buffalo

BUFFALO, Feb. 9.—A joint meeting of the Buffalo branch of the American Society of Mechanical Engineers and the local section of the Society of Automotive Engineers was held this week at the Hotel Statler. There was an attendance of more than 150 members of the two societies, in addition to a number of guests and resident non-member engineers.

The meeting was featured by a debate of the question, "Oil for Engines or Engines for Oil." L. H. Pomeroy took the ground that lubricating oils as made today are unsatisfactory for automobile engines, while A. Ludlow Clayden expressed contrary views.

Horning Summarizes Developments

CHICAGO, Feb. 8.—Of particular interest in tonight's program of the Midwest section of the Society of Automotive Engineers were the comments by Harry L. Horning of the Waukesha Motor Co. on the outstanding features of the cars exhibited at the national shows this year.

Mr. Horning mentioned the laminated spring engine mounting of the Maxwell car and cited many things in favor of the four-cylinder engine. Its chief objection in the past has been its vibration periods, he states. The Maxwell engine mounting, he said, practically prevents the transmission of vibration to the main frame members and, therefore, to the car itself.

Other items the speaker spoke of include the new crankshaft in the V-63 Cadillac, the Chandler Traffic Transmission, Chrysler oil filter, four-wheel brakes and balloon tires, balancing of rotating parts, shock absorbers, the Ross steering gear, rubber spring hangers, bearings with a

high lead content for places difficult to lubricate, the plain bearing fan and clutches with less inertia.

The next big advance in automobile construction, said Mr. Horning, will lie in the direction of improving transmissions, particularly as to easy shifting, or elimination of all need for shifting, with automatic means of selecting the reduction required for the particular load to be pulled.

O. B. Zimmerman of the International Harvester Co. gave a detailed account of the high degrees of standardization his company has reached in the building of three types of engines. Three of these engines now are used in eleven different units, seven of which are trucks and two tractors. Standardization of these engines makes possible forty-eight combinations without interfering with multiple production.

Carburetion and manifolding was the topic of the talk by Frank Mock of Stromberg Devices Co. Mr. Mock related some of the late developments in manifolding and also explained the results his company has obtained recently particularly as regards well creepage or surface flow in intake manifolds. He also spoke at some length on crankcase oil dilution.

The last two speakers, William F. Rockwell of the Wisconsin Axle Co. and George W. Smith of Nash Motors, dealt respectively with axles and gearsets.

INDUSTRIAL NOTES

Ott Rubber Co., Dubuque, Iowa, which is installing machinery and equipment in its factory building, 220 x 90 ft., expects to have the plant in operation by the latter part of the month. Already orders have been received for the capacity output during the first three months of operation and on a 10-hr. basis the plant expects to turn out 2000 tubes a day. An operating force of fifty men will be employed at the start. While inner tubes are to be a specialty the plant equipment is such that with slight changes, it can be turned over to the production of casings.

Westco-Chippewa Pump Co. has been incorporated in Illinois with \$2,150,000 capital of which \$150,000 will be used in its Illinois business, the only branch of the factory being located at the former Western Foundry company location, Moline. J. W. Bettendorf is president and C. S. Humphrey, secretary of the company, which has its main factory in Davenport, Iowa.

Marvel Gas Saver Co., Rockford, Ill., organized a year ago to produce a gas saving device for automobiles, as a subsidiary of the Fryac Manufacturing Co., has surrendered its charter. A. F. Hogland and Mead Durbrow, officers, will turn the plant over to the manufacture of Fryac spotlights.

Thomas Corcoran Lamp Co., Cincinnati, is now in the process of constructing an additional plant that will enable it to double its production of automobile lamps and spotlights. Production will be concentrated in the new building when completed.

Royal Palm Rubber Co., a new corporation formed recently at Kelsey City, Fla., has awarded contracts for the construction of a new plant to manufacture automobile tires and tubes.

METAL MARKETS

Steel market conditions have been painted in so bright colors since the year's beginning that the United States Steel Corp.'s unfilled tonnage statement, showing an 8 per cent increase in January over December, did not come in for more than passing notice by even the most enthusiastic of the optimists. There is no doubt that the leading interest has fared considerably better in the volume of forward business booked than have the independents, especially the smaller ones among the latter. In fact, the one weak spot in the situation is the lack of long-time contracts. Sheet rollers are operating at virtually full capacity; in fact, those making full-finished automobile sheets are running more and more behind on deliveries, but this condition by no means gives assurance of equally continuous operations during the year's second quarter.

It is this strictly hand-to-mouth buying that in the last few days has caused some of the Pittsburgh steel producers to characterize automotive purchases as subnormal, when, in fact, there has been no change in the situation except that automotive purchasing agents can see nothing in the market developments to cause a change in their policy of covering their steel requirements solely in conformity with their own immediate operating schedules. Alloy steel mills working on automotive steels appear to fare very well amid these conditions, enjoying sufficient orders to make possible profitable operations. The price situation remains virtually unchanged. Prices for bolts and nuts have undergone a slight advance.

Sheets, cold-finished bars, and strip steel are steady, minor concessions being the rare exception and only in case of very attractive specifications. In the white non-ferrous metals, tin and lead consumers face difficult problems. While the tin market has been lifted to much higher levels through speculative manipulation, actual famine conditions have once more been reached in lead, and storage battery makers are decidedly up against it. While importations may bring some relief, conditions are not as favorable for these as they were during the shortage of last March. Today's shortage denotes more so than it did then a world-wide deficiency in the supply of this metal. It remains to be seen to what extent production will be stimulated by the abnormally high prices now current for lead ores. These are virtually on a parity with the record prices paid during mid-summer of 1917 when munition makers competed eagerly for every pound of lead in sight.

Pig Iron.—What transactions in foundry iron are taking place are approximately on a \$24, valley, basis. Blast furnace interests are rather reserved, and apparently not eager to sell more than routine tonnages. The fact that the leading steel interest has bought a round tonnage of basic, has had a sentimental effect on the attitude of sellers of foundry and malleable.

Aluminum.—The movement of European aluminum to the United States is of a routine character, the tonnages allotted to this market being earmarked against standing contracts.

Copper.—The ingot metal market shows only slight improvement. Much better demand for copper and brass products is noted, however, and Waterbury mills are working at full speed, a good many automotive orders being on their books.

Calendar

FOREIGN SHOWS

March 14-23—Geneva, International Motor Exhibition, under the auspices of La Chambre Syndicale Suisse de l'Industrie Automobile.

April 2-13—Barcelona, Automobile Exposition, under the auspices of the Confederación de Camaras Sindicales Espanolas del Automovilismo y Ciclismo, Palacio de Arte Moderno.

Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.

Oct. 17-25—London, Annual Passenger Car Show, Olympia.

RACES

Aug. 3—Lyons, France, European Grand Prix.

April 27—Trapani, Italy, International Automobile Race.

CONVENTIONS

March 31-April 4—New Orleans, Annual Spring Meeting of

the Automotive Equipment Association.

May 21-24—Detroit, International Motor Transport Congress under the auspices of the National Automobile Chamber of Commerce.

June 3-4—Detroit, Midsummer Meeting of the Automobile Body Builders Association, Hotel Statler.

June—Washington, Pan American Highway Congress, under the auspices of the Pan American Highway Mission.

Sept. 22-26—Boston, Sixth Convention and International Steel Exposition of the American Society for Steel Treating.

S. A. E. MEETINGS

March 13—Metropolitan Section, Replacement Parts and Accessories.

April 17—Metropolitan Section, Fleet Maintenance, F. W. Winchester.

May 15—Metropolitan Section, What Roads and Steels Do to Automobiles.

G. M. Tract to Offer Every Type of Road

NEW YORK, Feb. 11—The General Technical Committee of the General Motors Corp. will have supervision of the tests and control of the management of the tract of land comprising 1124 acres in Oakland and Livingstone Counties, Mich., bought last week by the parent company.

The tract, which will become an outdoor laboratory and the first of its kind in the world, is comparable only with the Long Island Motor Parkway, privately owned, on which there is no speed limit, and with the Indianapolis speedway, as a test ground for cars.

The committee will set about converting the tract into a test plant. When operations are completed it will present all types of road, from the most modern and improved pavement to the most rugged and rudimentary wagon-track. Grades varying from 8 to 18 per cent will test the hill-climbing ability of the General Motors units, while already there is a hill 250 ft. above the level of the plain on the property.

Will Build Straightaway

A straightaway one and one-eighth mile long will be constructed, one half of concrete and the other half of gravel, with ample space at either end for turns, made possible because the tract is a mile and a half square. A winding road five miles long that can be extended later to several times this length of gravel that will present varying grades as well as level stretches, also will be specially constructed.

Besides the road construction work required for the tests, suitable garage accommodations and equipment for examination and repair of cars under test will be provided. A community house, with suitable living quarters for General Motors executives, is planned. It is expected that members of the Technical Committee will make frequent visits of inspection to the proving ground. A corps of experts will be quartered there, with unusual facilities for making impartial tests, under uniform conditions of road and without traffic interference, such as is encountered on public roads.

Ultimately it is planned to encircle the tract with a board fence, which will in-

sure privacy such as could not be had elsewhere. This will allow General Motors engineers to conduct tests of new ideas which would stop rumors of possible changes in construction or new models which always are heard whenever tests are made on public highways.

4194 Cars Registered in Detroit Last Month

DETROIT, Feb. 13—New cars registered in Detroit during January totaled 4194, an increase from 2746 in the same month a year ago and an increase over December, which totaled 3227. Closed cars with 2833 represented about 70 per cent of the month's business, comparing with 1419 for January last year and 2198 in December. The figures are contained in the monthly bulletin of the Detroit Automobile Dealers Association.

Ford deliveries in January aggregated 2348, of which 1619 were closed cars. Chevrolet with 349 was the next largest make delivered. In the medium priced field Studebaker delivered 157; Buick, 149; Essex, 137; Hudson, 131; Maxwell, 121; Dodge Brothers, 111; Olds, 65; Jewett, 61; Hupp, 60; Willis-Knight, 53; Oakland, 50; Nash, 41, and Rickenbacker, 31.

In the higher priced lines Packard delivered 40; Cadillac, 30; Peerless, 19; Jordan, 10; Paige, 7; Lincoln 6, and Marmon, 5.

Truck deliveries totaled 550, as against 319 in December. Of these 362 were Ford, 25 Reo, 21 Chevrolet and 21 Dodge Brothers. Federal delivered 13; White, 12; G.M.C., 11; Fifth Avenue, 16; International, 8; Gotfredson, 7; Standard, 8; Mack, 5; Autocar, 4, and Graham, 3.

Stocks of Used Cars Decline

DETROIT, Feb. 11—Used car stocks in the hands of leading dealers in Detroit, represented in the Detroit Automobile Dealers Association, totaled 1250, valued at \$619,090, an average valuation per car of \$495.

For December the sale of new cars was about the same as the previous year, while used car sales showed an increase of 25 per cent. The inventory of used cars Jan. 1 was lower than for any other month during 1923, indicating, says the association, that members are watching used car stocks and putting greater effort into their sale.

Senator Broadcasts Good Roads Message

WASHINGTON, Feb. 11—Impetus to the good roads movement has been given by United States Senator Thomas Sterling of South Dakota, chairman of the Senate Committee on Post Office and Post Roads, who made a plea for the continuation of Federal aid in an address broadcast under the auspices of the American Automobile Association.

After outlining the need of a Federal appropriation of \$100,000,000 a year for ten years, and a like appropriation from the States, if the system of 170,000 miles of Federal aid highways is to be completed within ten years, Senator Sterling stated that he was not prepared to say just how much money Congress would appropriate.

He then said:

We have provided ourselves with the motor vehicle rolling stock at a cost of many billions of dollars, and we must now provide the tracks upon which to operate it.

The wholesale value of automobiles and trucks manufactured last year amounted to over \$2,500,000,000 and the wholesale value of tires amounted to \$760,000,000 and we spent \$1,000,000,000 for automobile parts and accessories, excluding tires, so it is certainly not unsound reasoning to propose that we should spend at least \$100,000,000 a year from the Federal treasury and an equal amount by the States in order to complete our Federal highway system within a reasonable length of time.

We must not forget that the good roads built under this system serve even a higher use than that of the tourist on pleasure bent. We must not overlook the commercial and economic advantages of a system of good roads; of what they mean to the farmer, who on such roads and by means of the motor truck, finds it easy and a great saving of time and expense in transporting his products to market. I do not believe that there should be the least hesitation about going forward with the program.

MADISON TIRE MERGER

NEW YORK, Feb. 11—Stockholders of the Madison Tire & Rubber Co. will be asked at the annual meeting on Feb. 19 to vote on a merger with the U. S. Rubber Reclaiming Co., Inc., a subsidiary, and a change of name of the merged concerns to the U. S. Rubber Reclaiming Co., Inc.